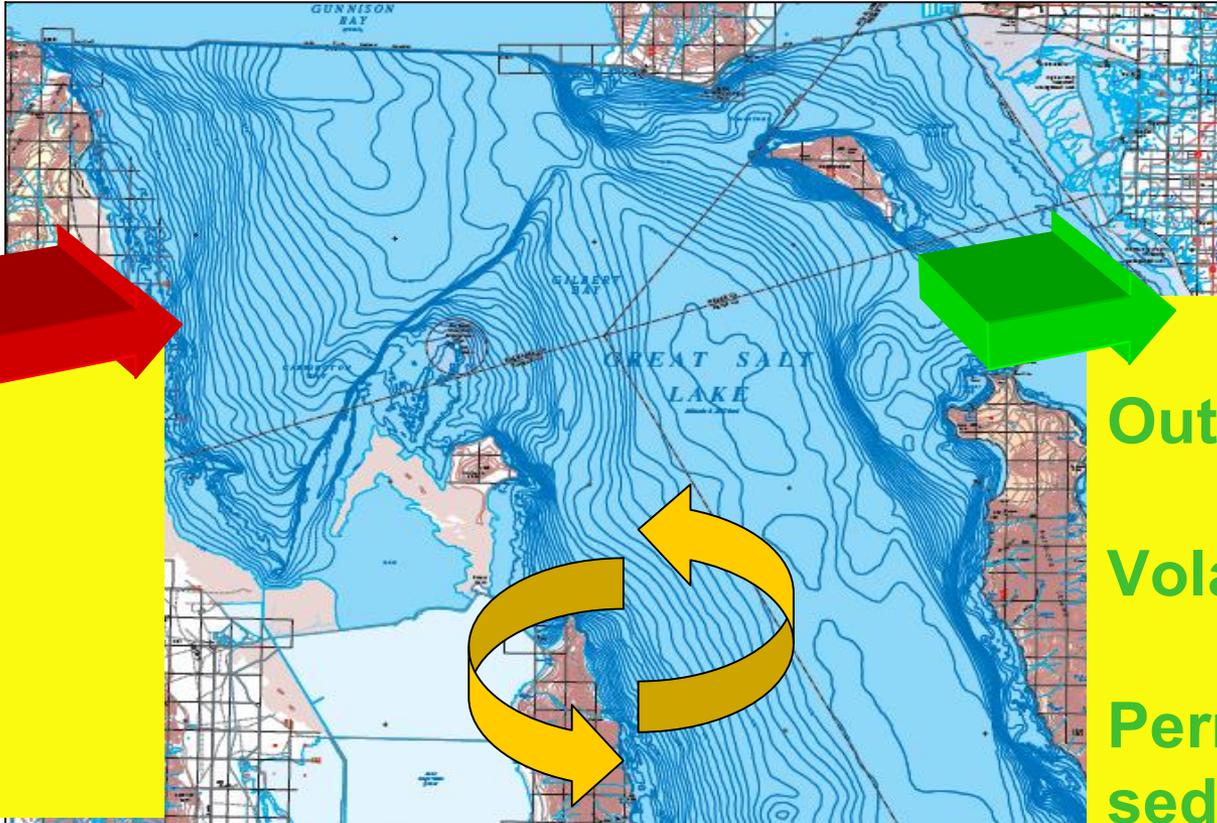




Project 4 :
**Estimation of selenium
removal fluxes**

Se fluxes in the South Arm



Inputs:

**Rivers
&
streams**

Outputs:

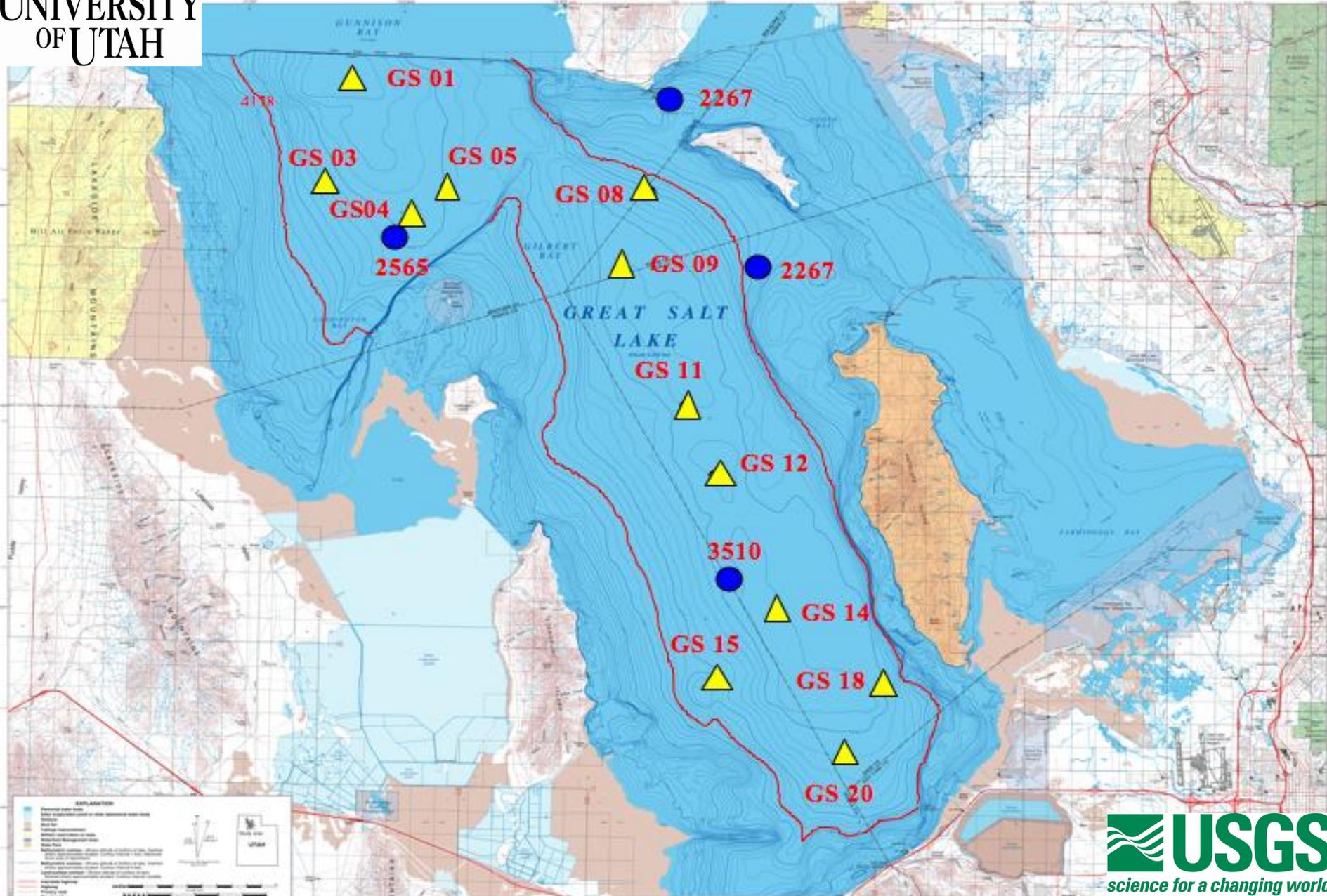
Volatilization

**Permanent
sedimentation**

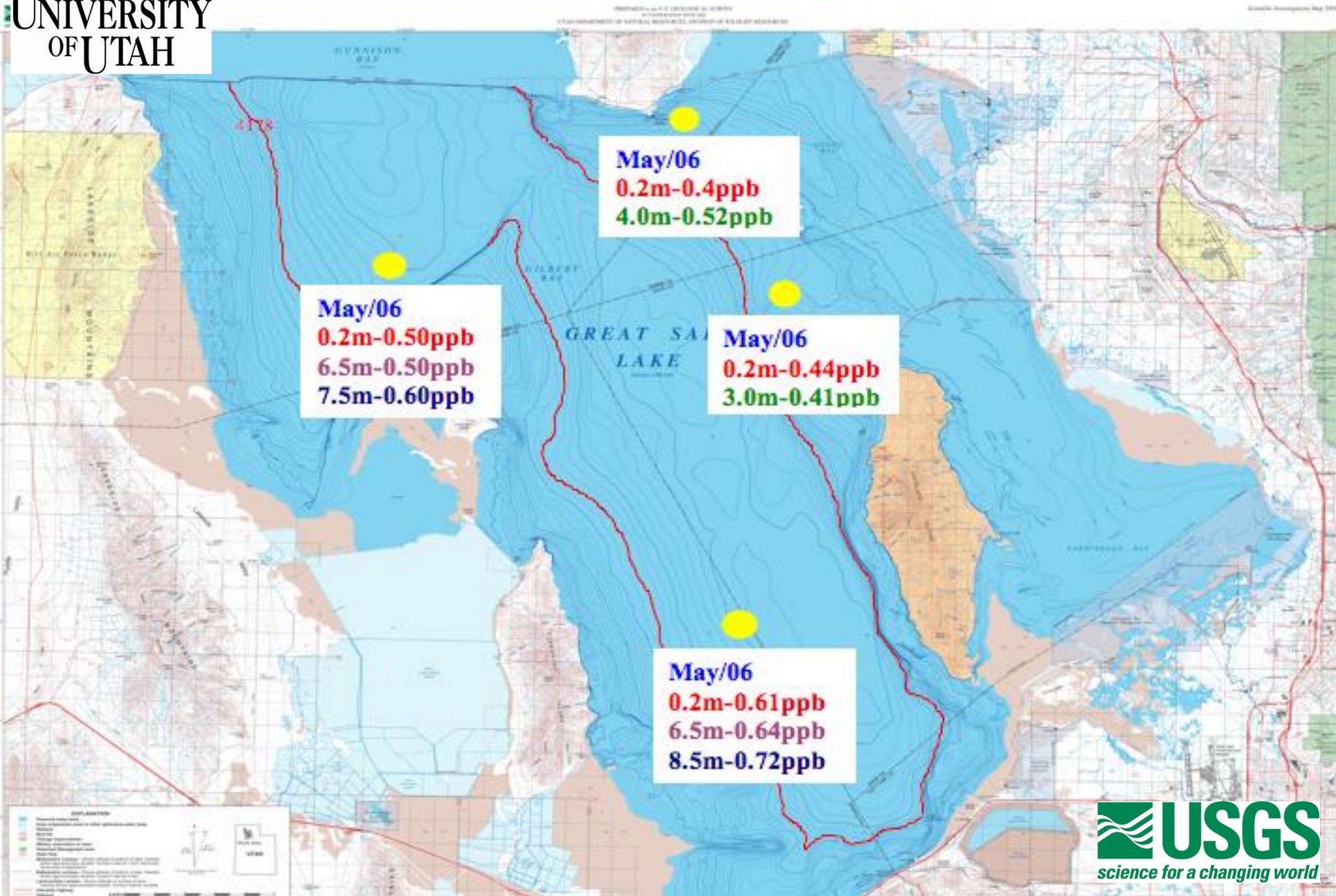
Storage in water column:

**Dissolved species
Suspended particulates**

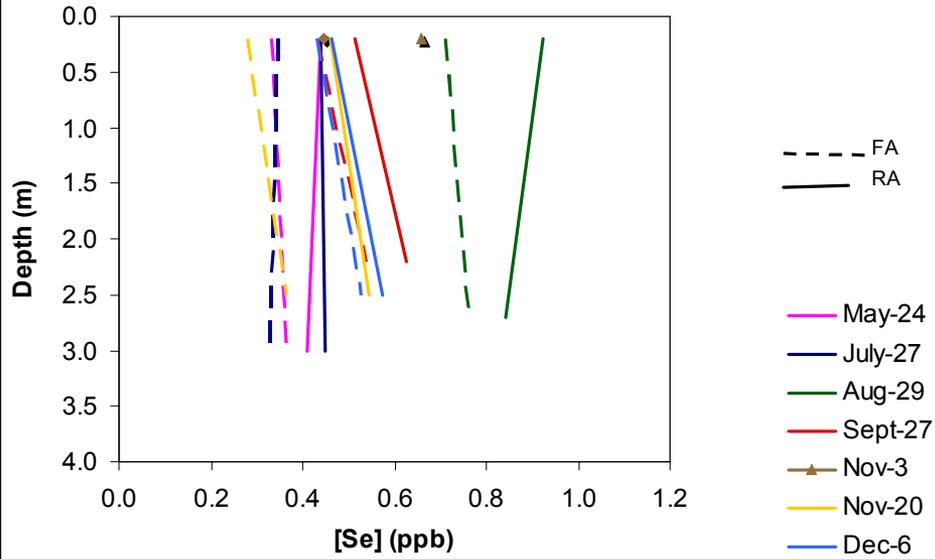
Sampling locations



Se conc. in water

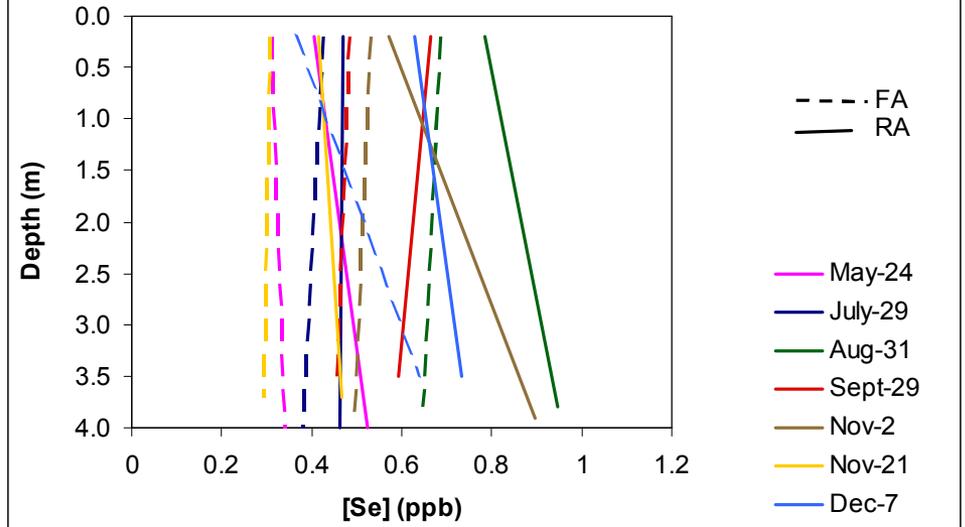


Site 2767

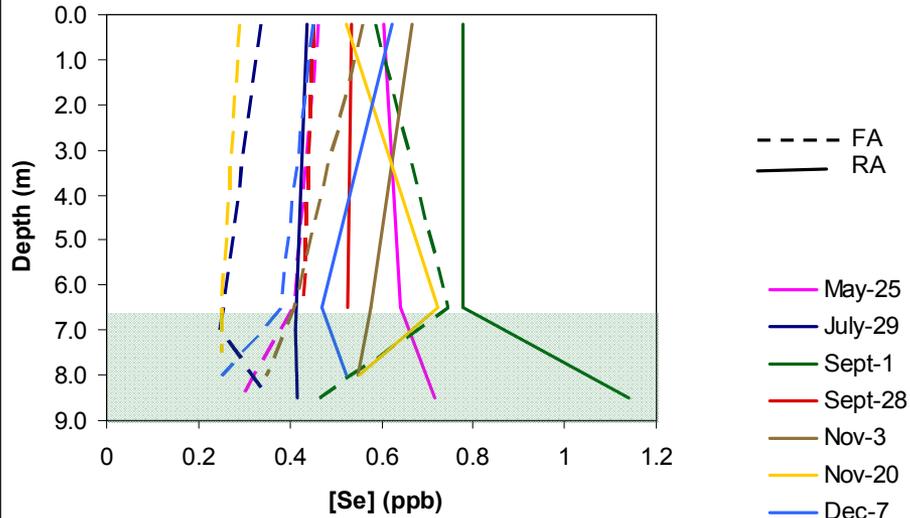


Shallow Layer

Site 2267

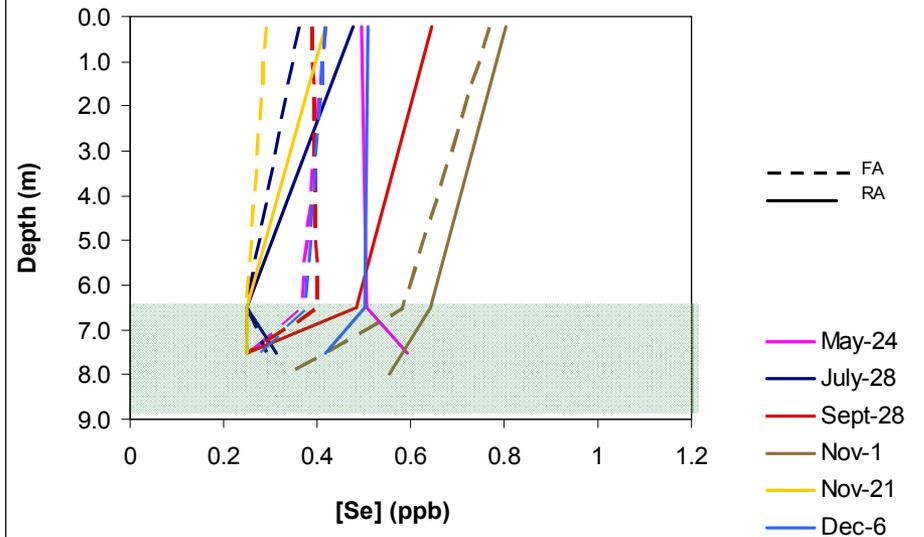


Site 3510



Shallow and deep brine layers

Site 2565

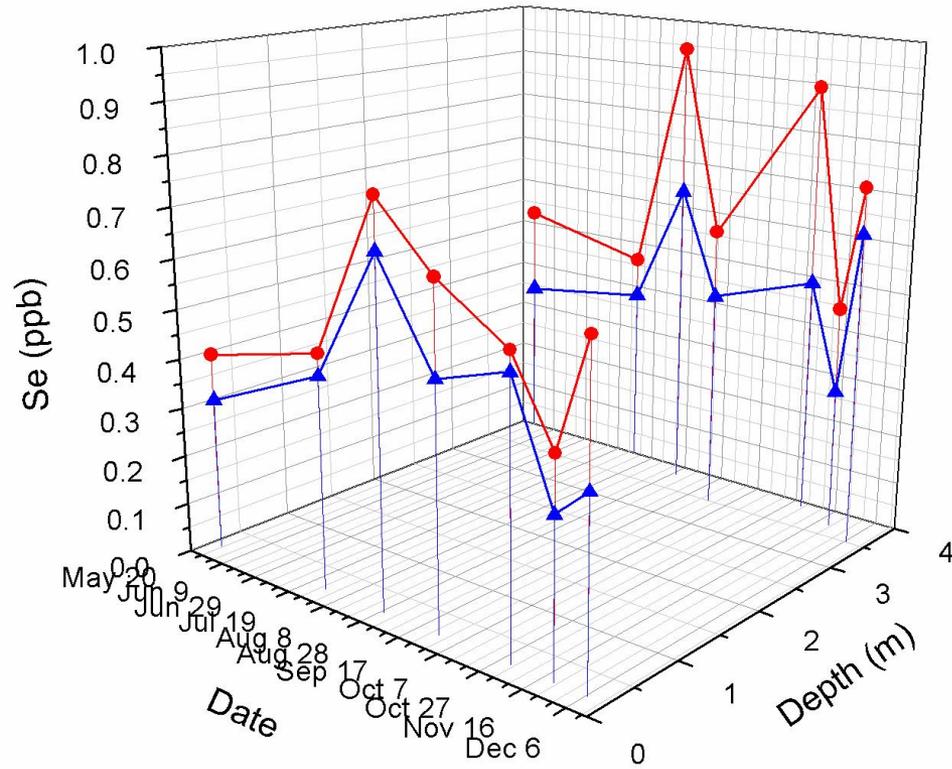


Site 2267

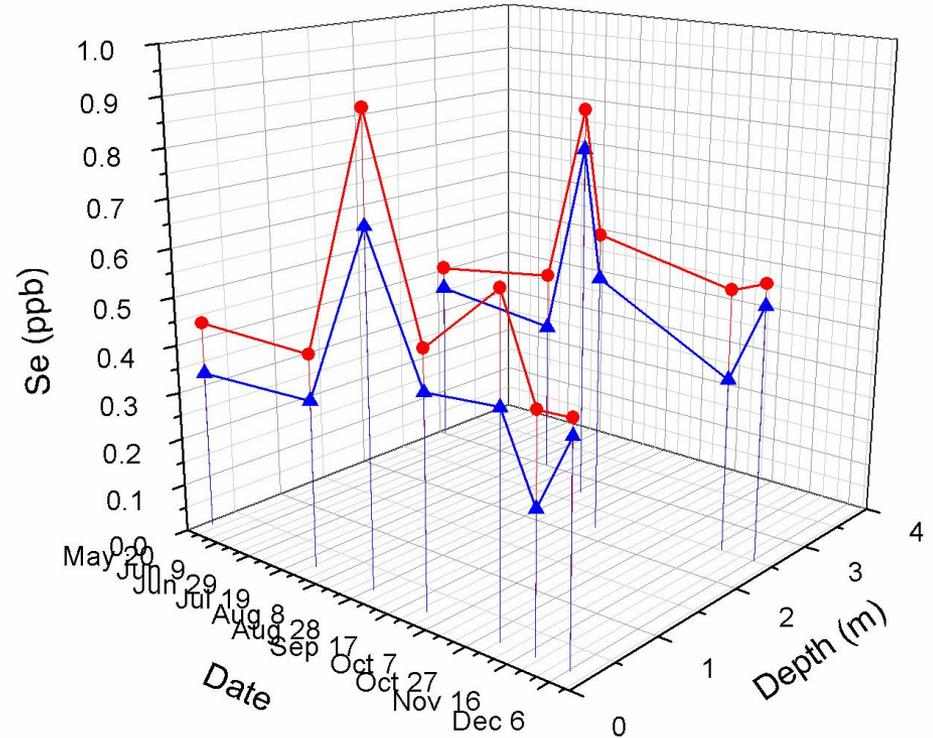
- RA
- ▲ FA

Site 2767

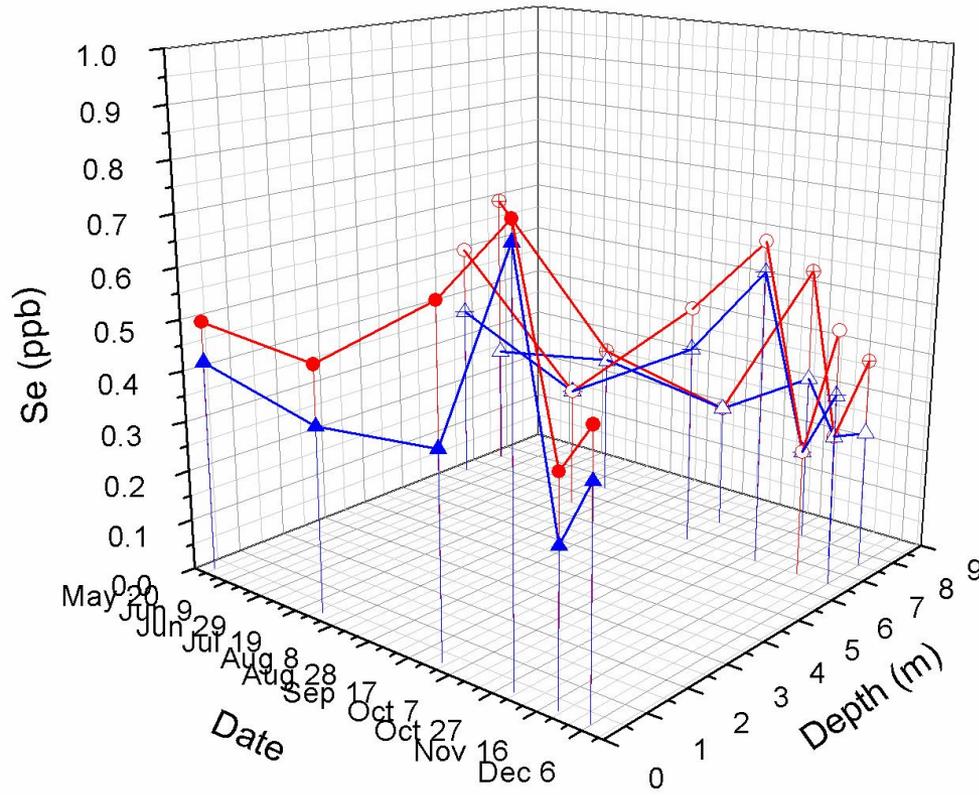
- RA
- ▲ FA



Shallow brine layer

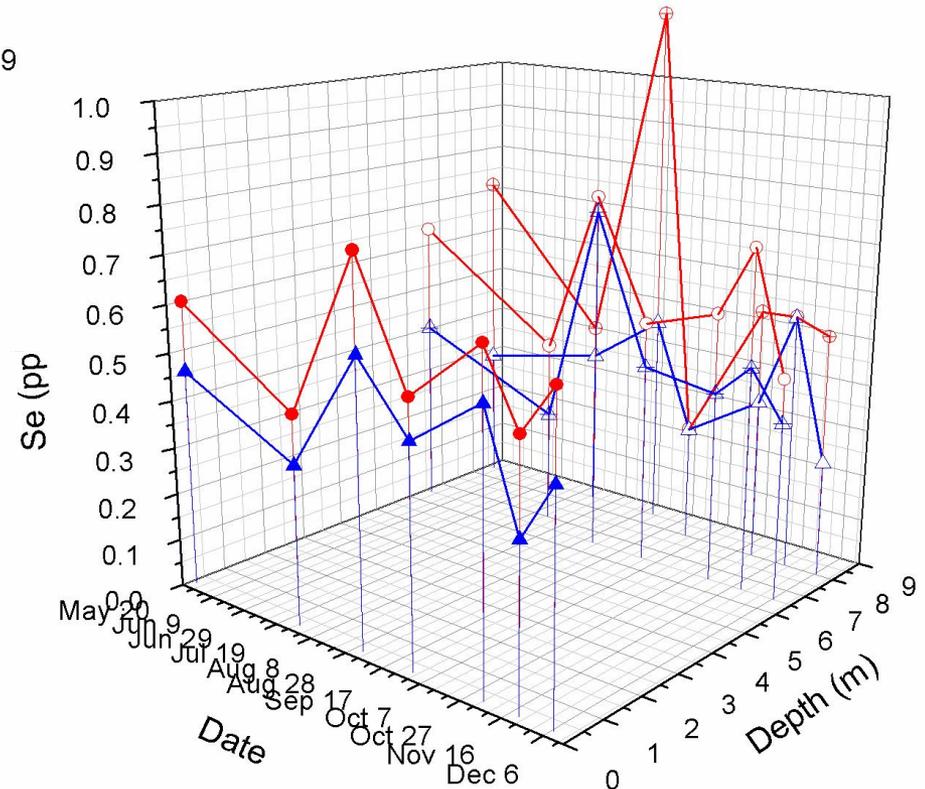


Site 2565

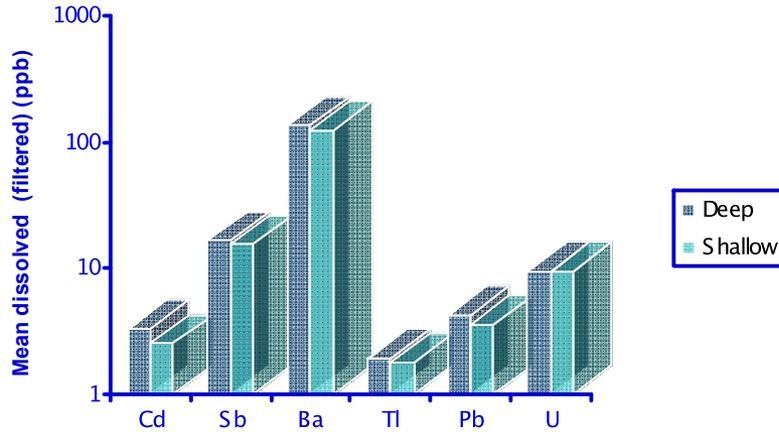


- RA ▲ FA - 0.2m
- ⊕ RA ▲ FA - 6.5m
- RA ▲ FA - 8 m

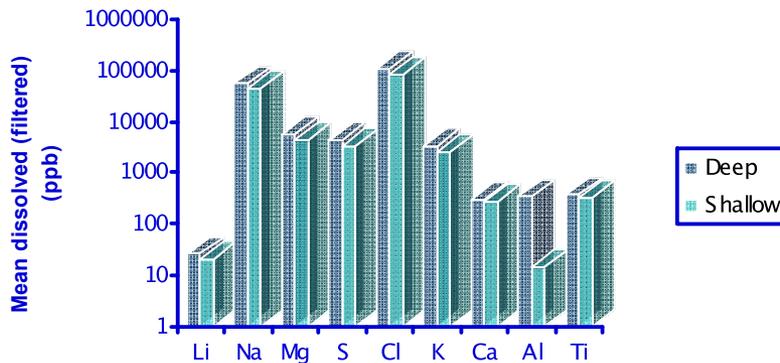
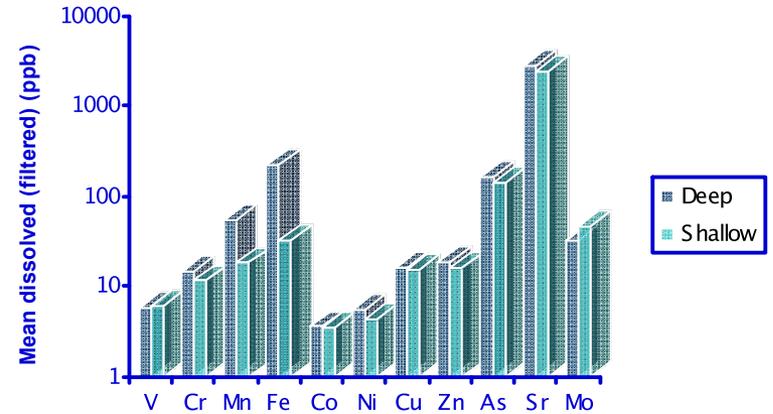
Site 3510



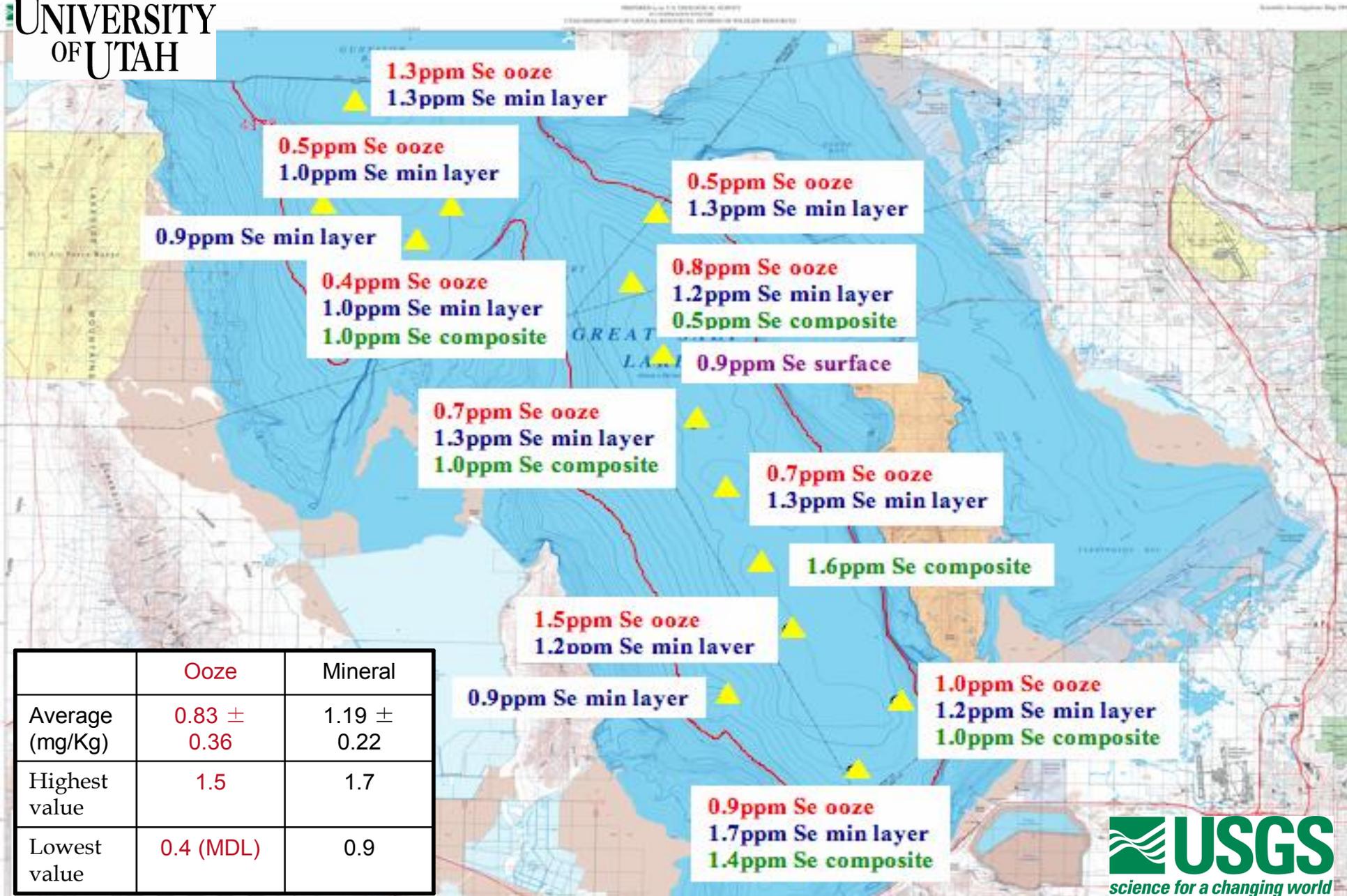
Shallow and deep brine layers



Multi elements in shallow and deep brine layers

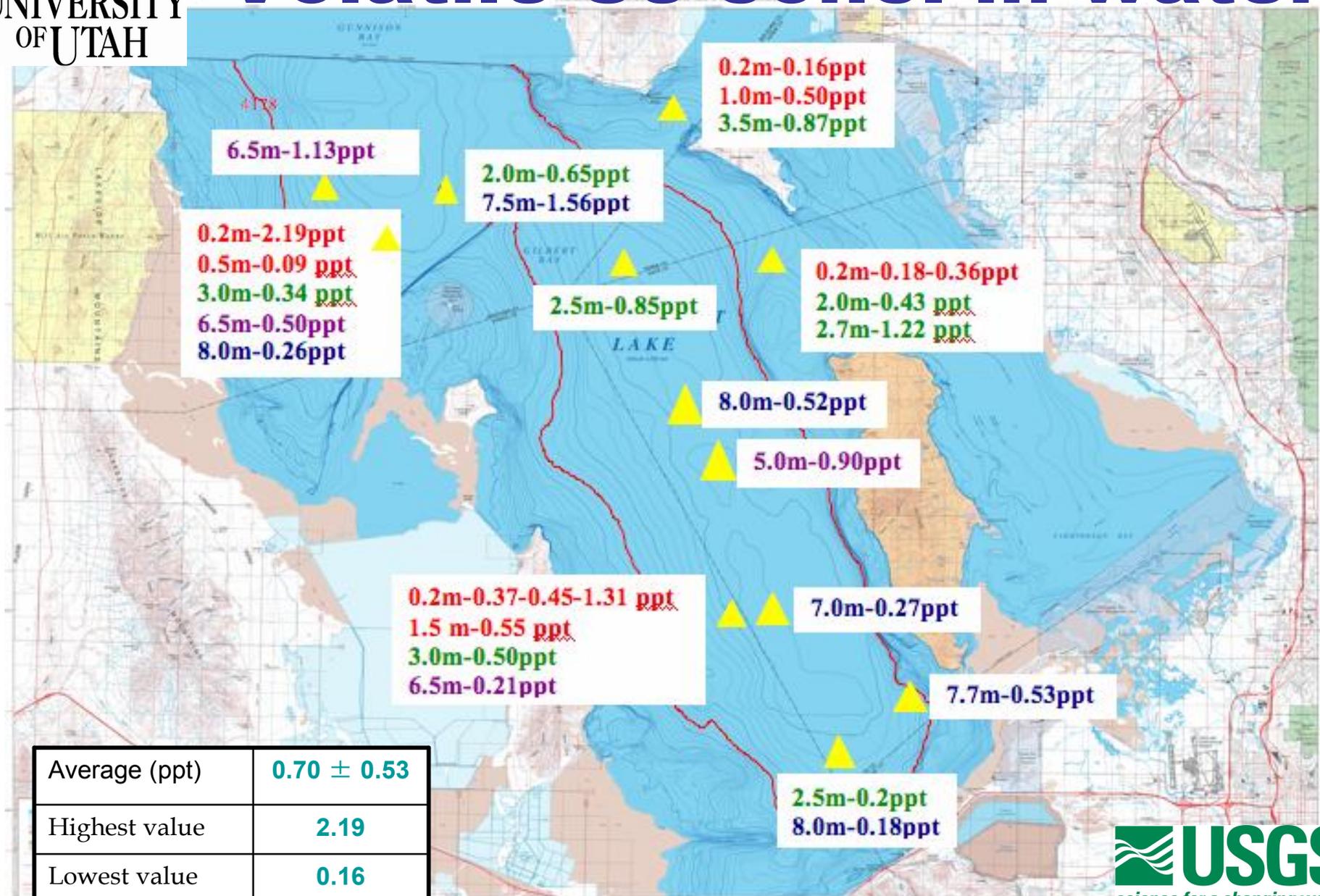


Se conc. in sediments



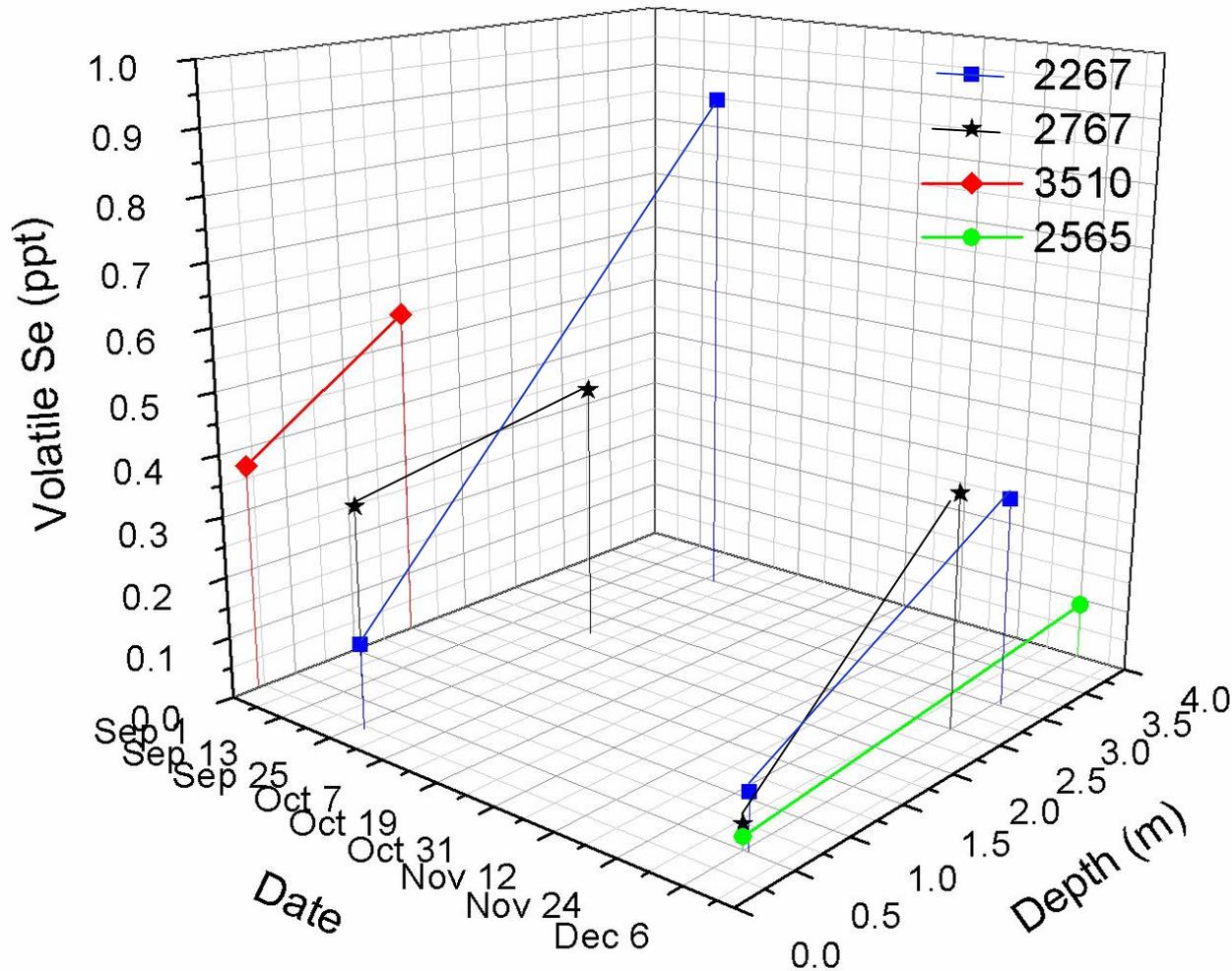
	Ooze	Mineral
Average (mg/Kg)	0.83 ± 0.36	1.19 ± 0.22
Highest value	1.5	1.7
Lowest value	0.4 (MDL)	0.9

Volatle Se conc. in water

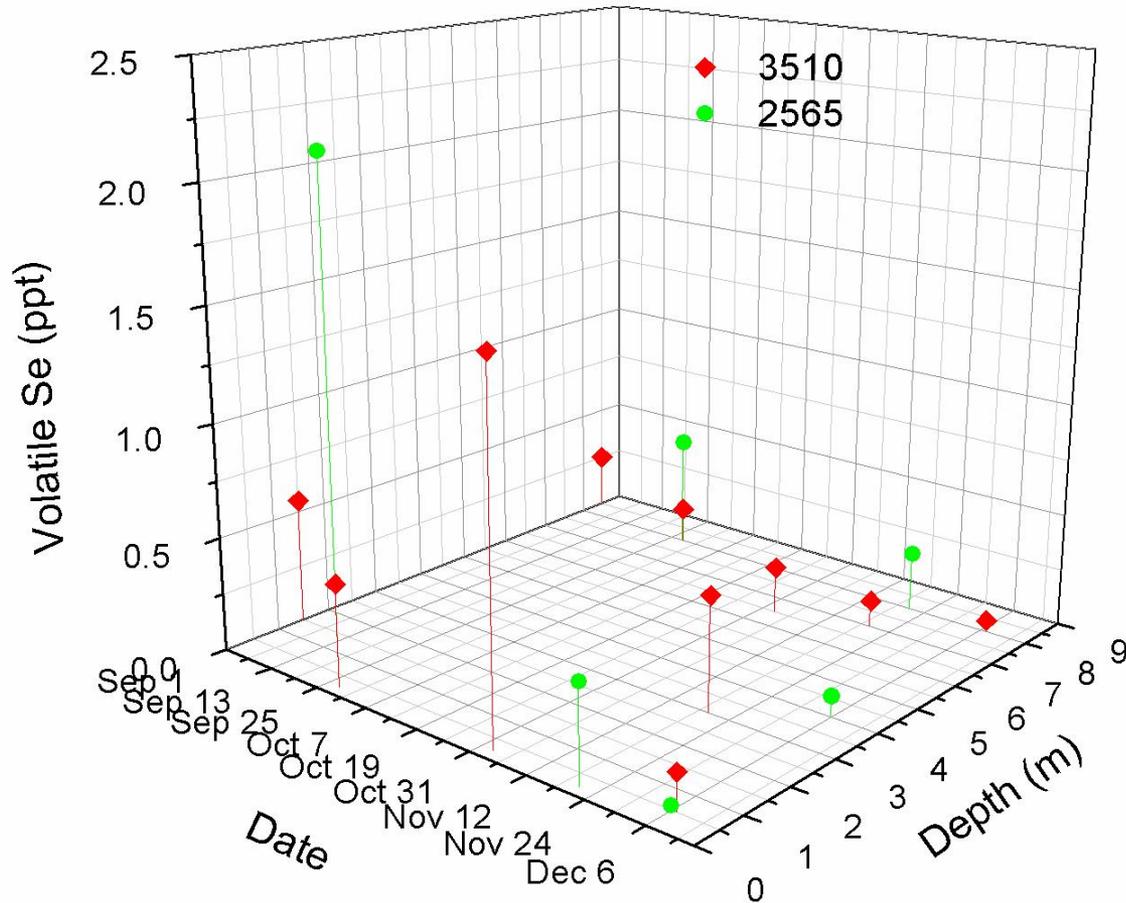


Average (ppt)	0.70 ± 0.53
Highest value	2.19
Lowest value	0.16

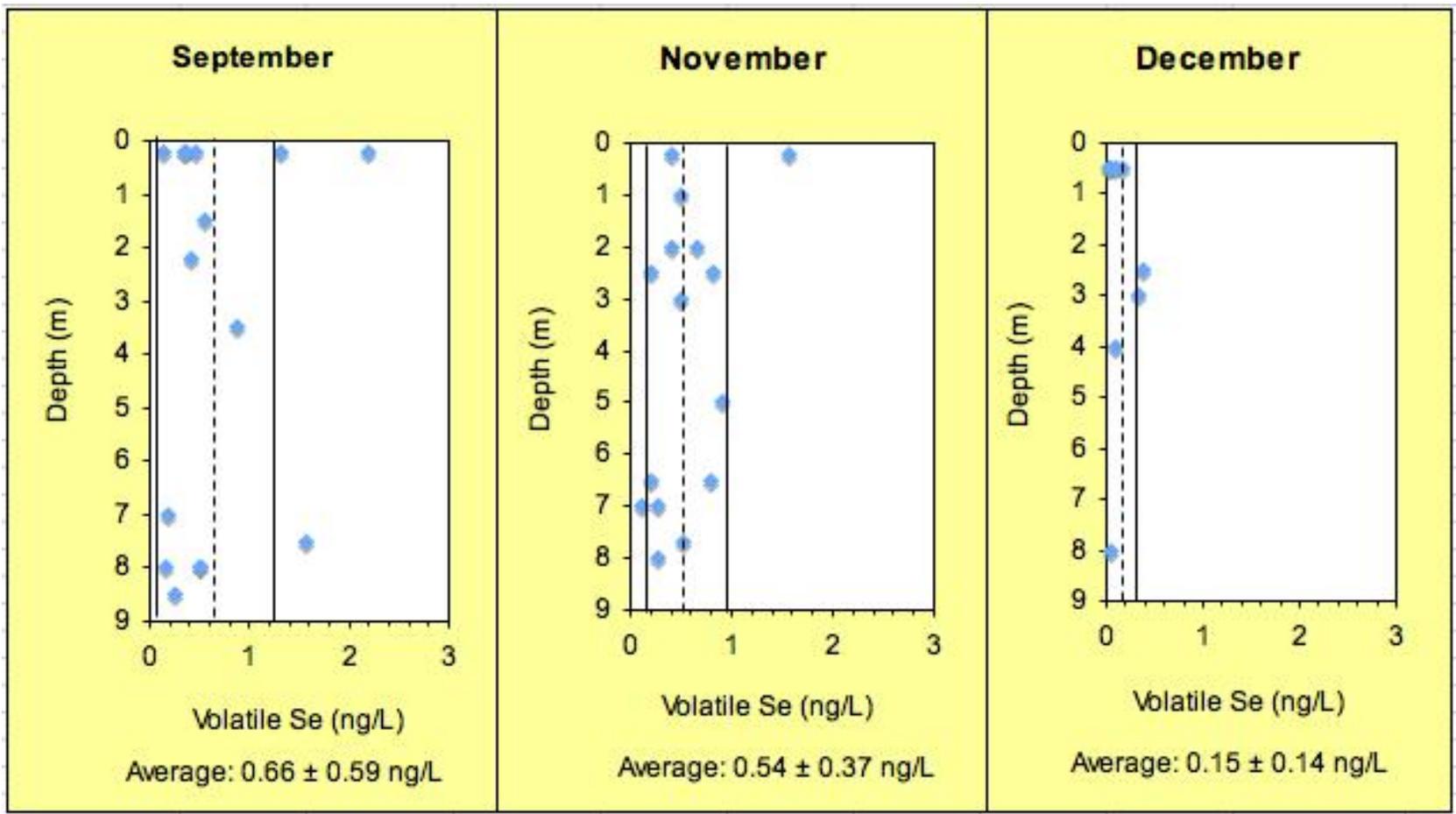
Volatiles Se conc. in shallow water



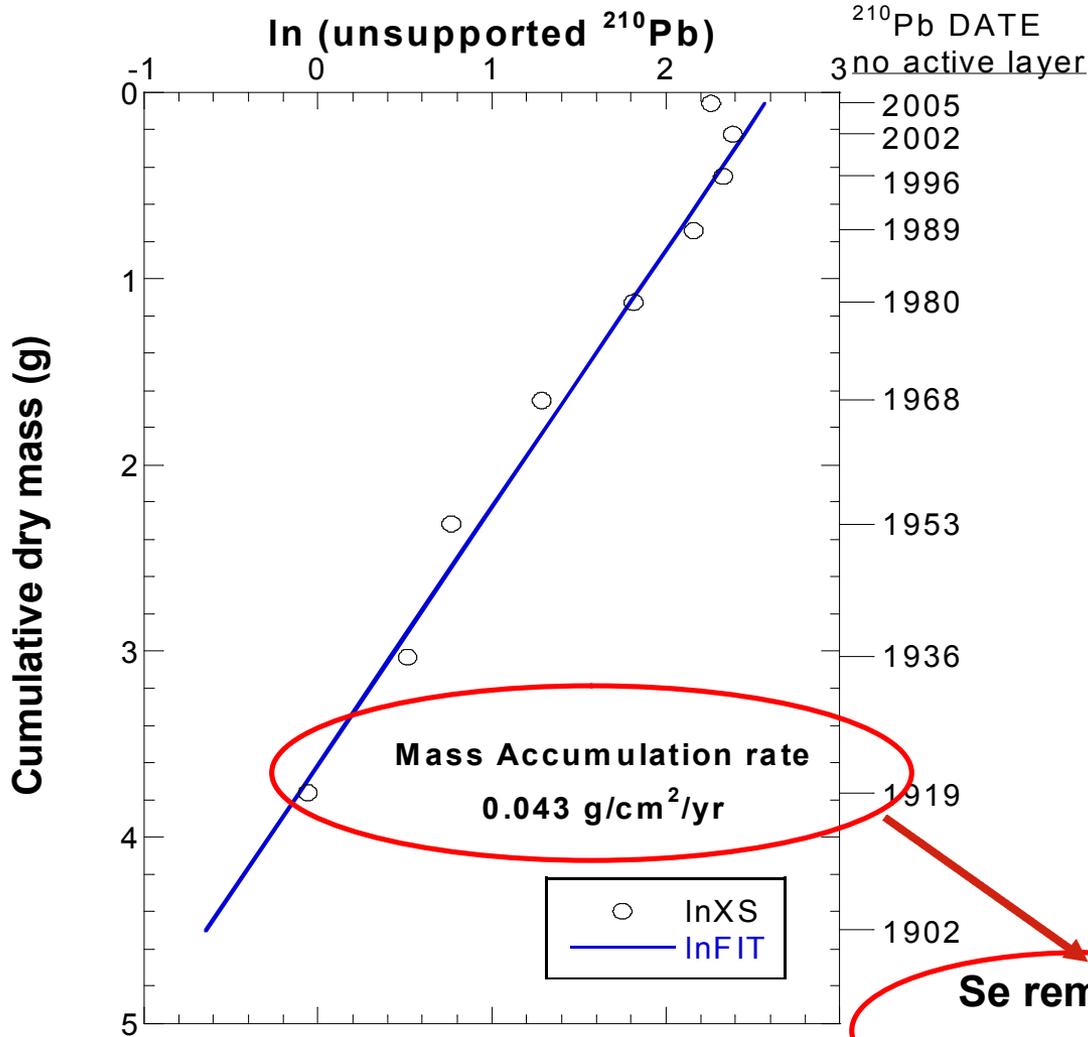
Volatiles Se conc. in entire water column



Volatile Se conc. - Temporal -



Net sedimentation flux



Se removal
770 Kg Se/yr

Percentage of overall removal

Volatilization:

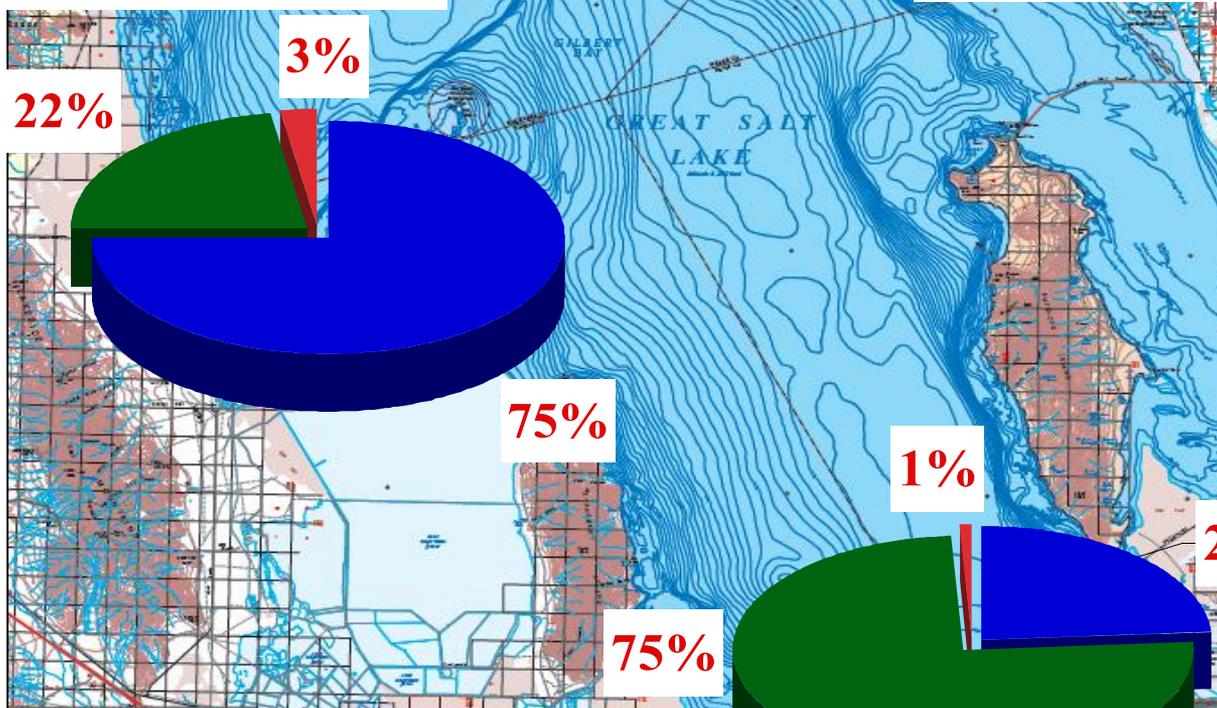
231 Kg/yr (u = 5MPH)
2425 Kg/yr (u = 25MPH)

Harvesting brine shrimp/cysts:

26 Kg/yr

(Marden, 2006)

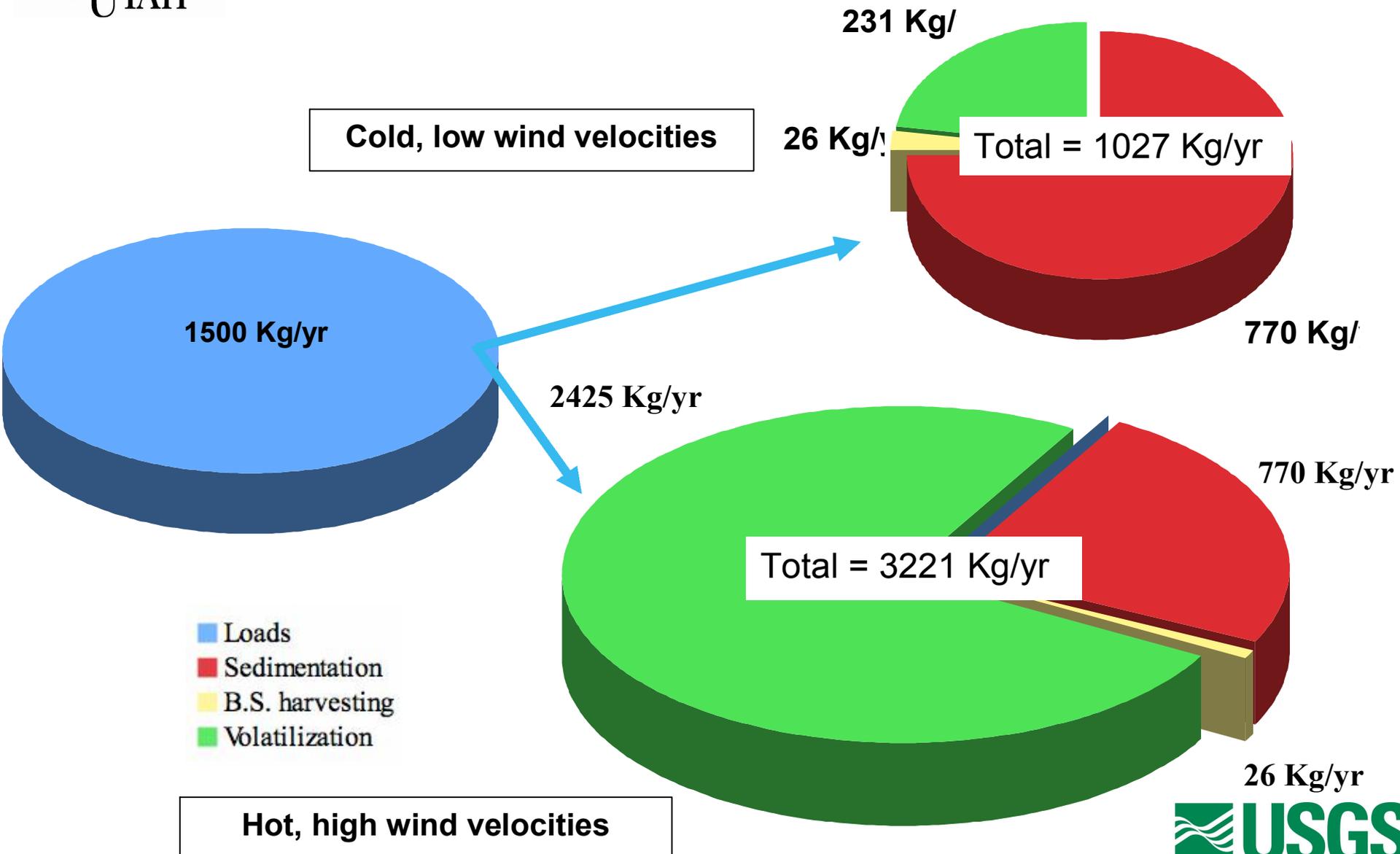
u = 5 MPH



Sedimentation:
770 Kg Se/yr

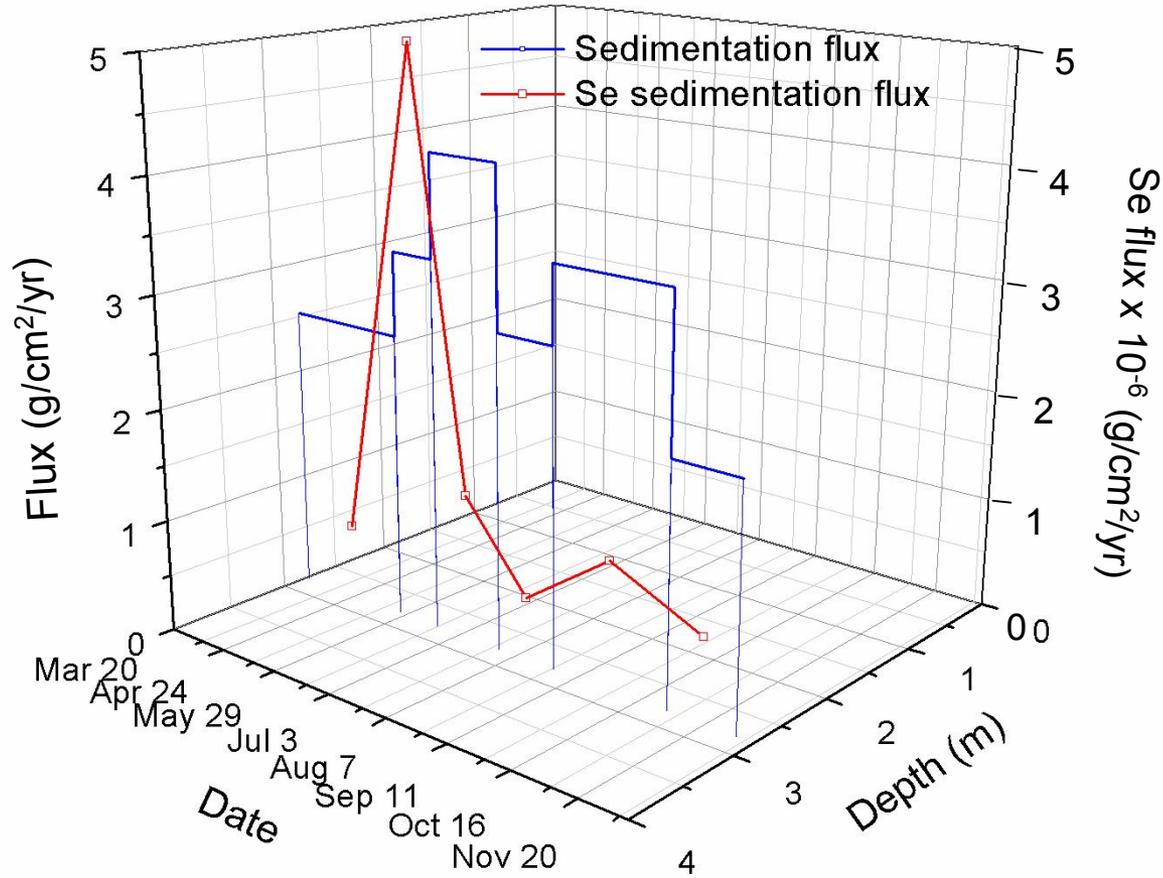
u = 25 MPH

Selenium distribution



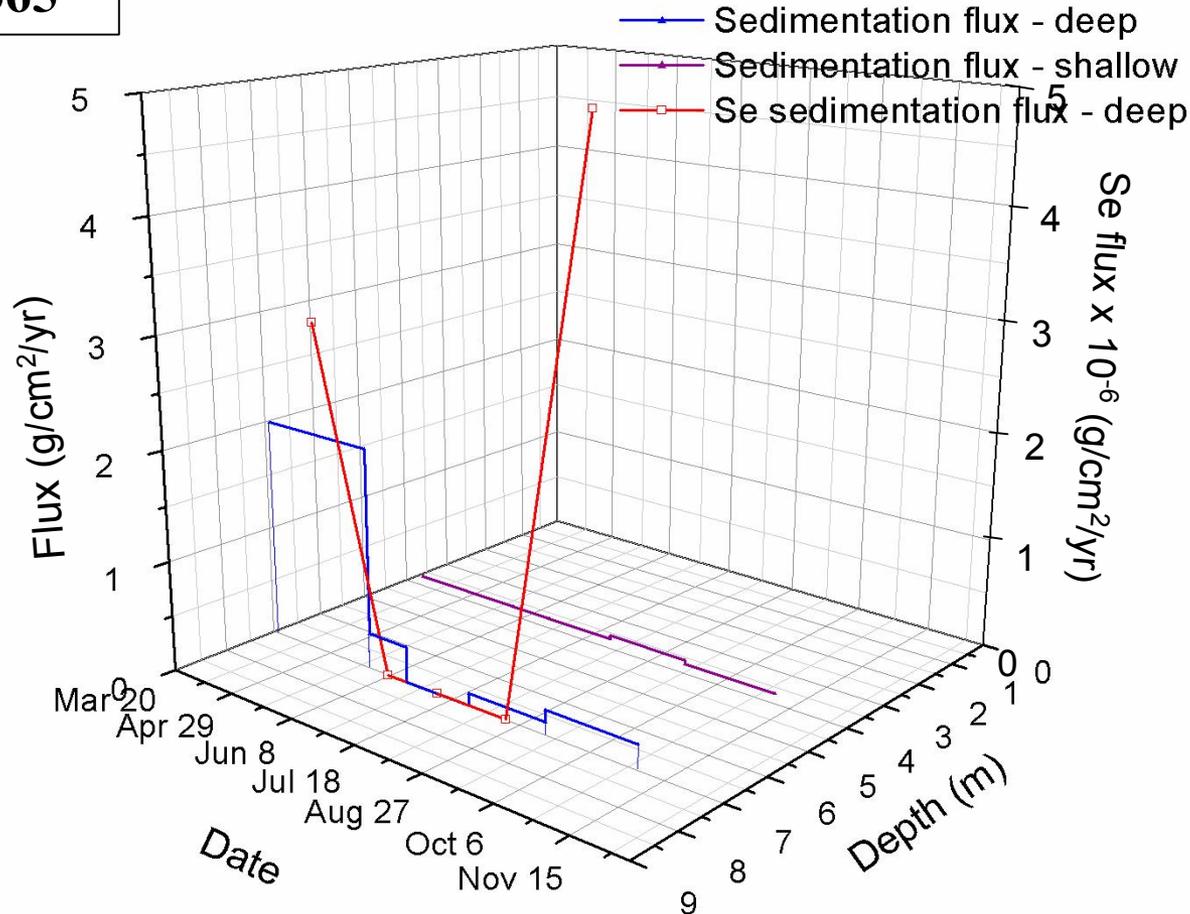
Downward sedimentation flux

Site 2267



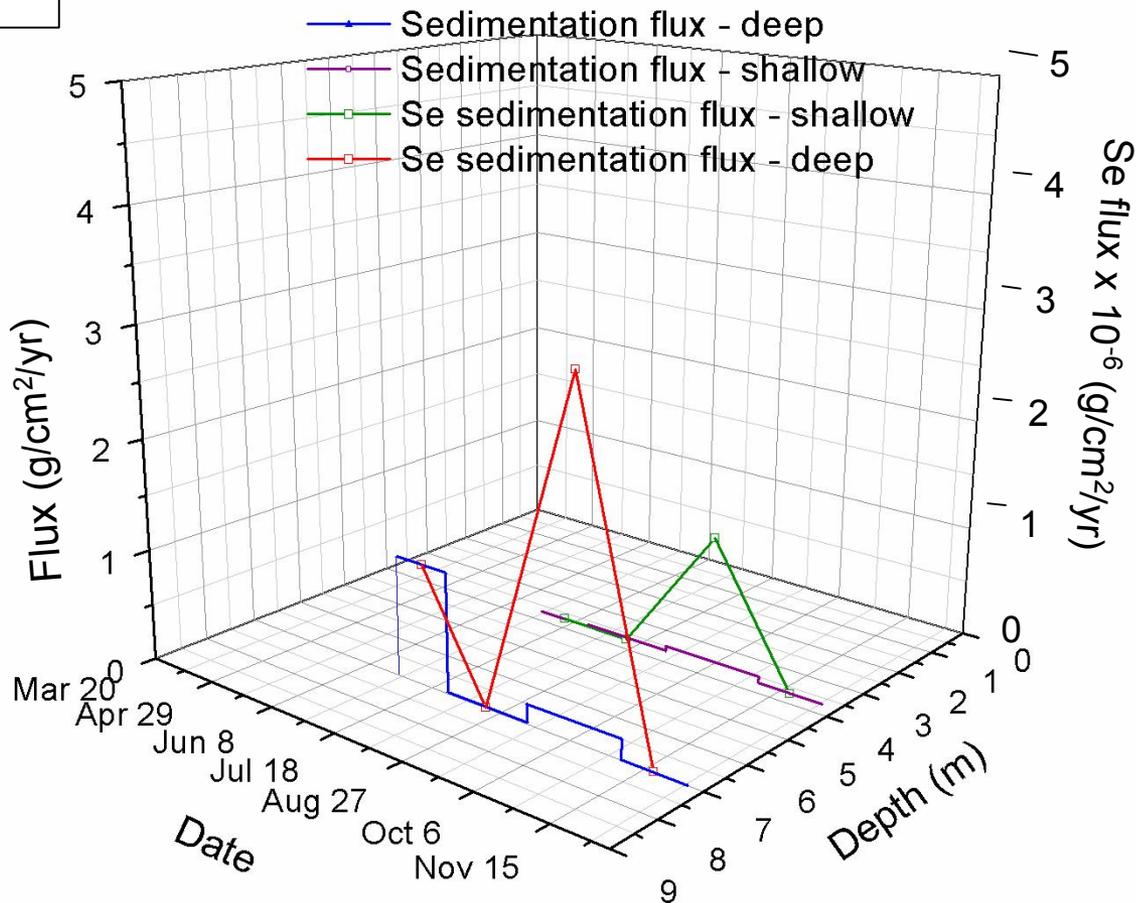
Downward sedimentation flux

Site 2565



Downward sedimentation flux

Site 3510

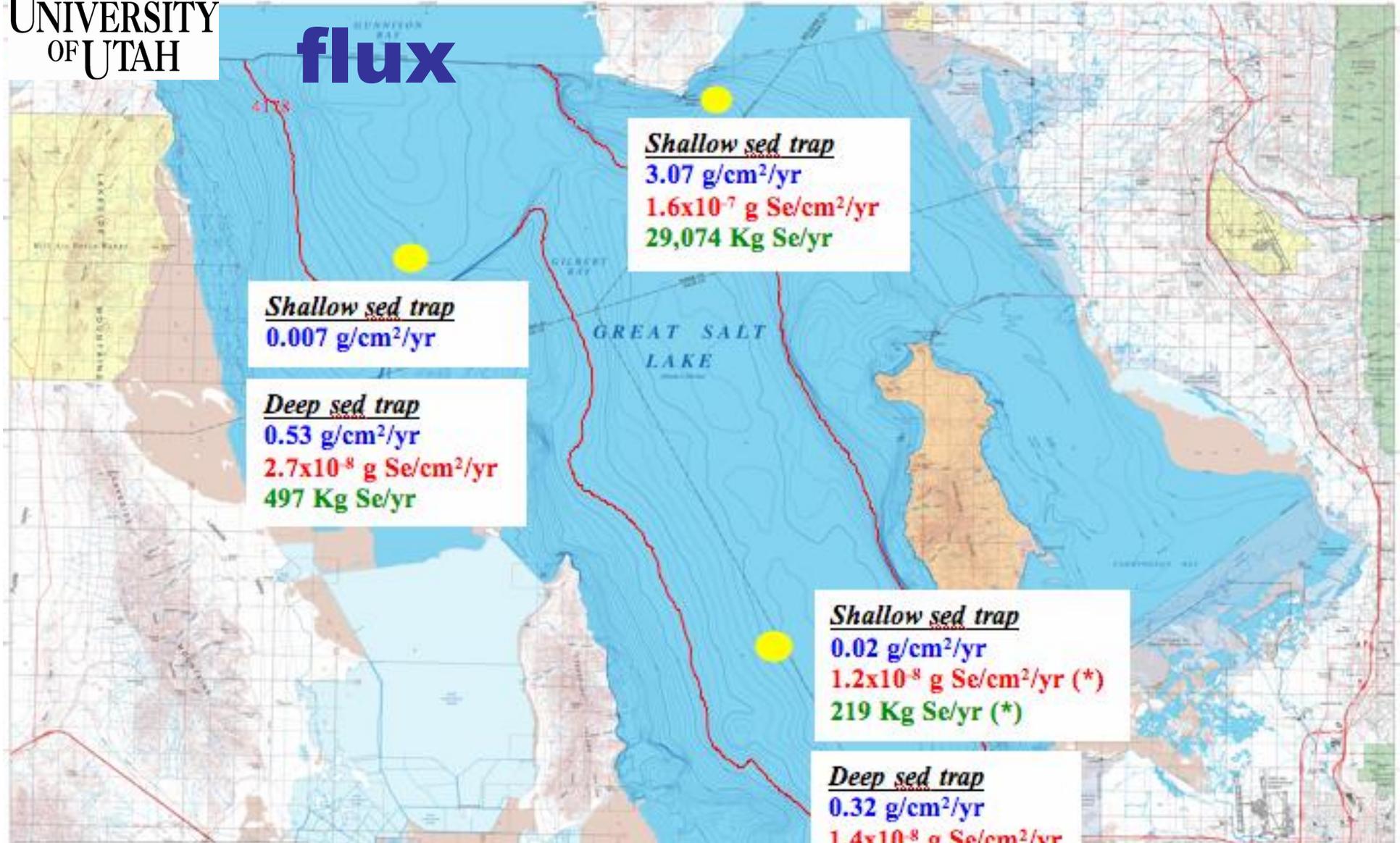


No "BUOY" Left Behind

Mission Accomplished!



Downward sedimentation flux



Shallow sed trap
3.07 g/cm²/yr
1.6x10⁻⁷ g Se/cm²/yr
29,074 Kg Se/yr

Shallow sed trap
0.007 g/cm²/yr

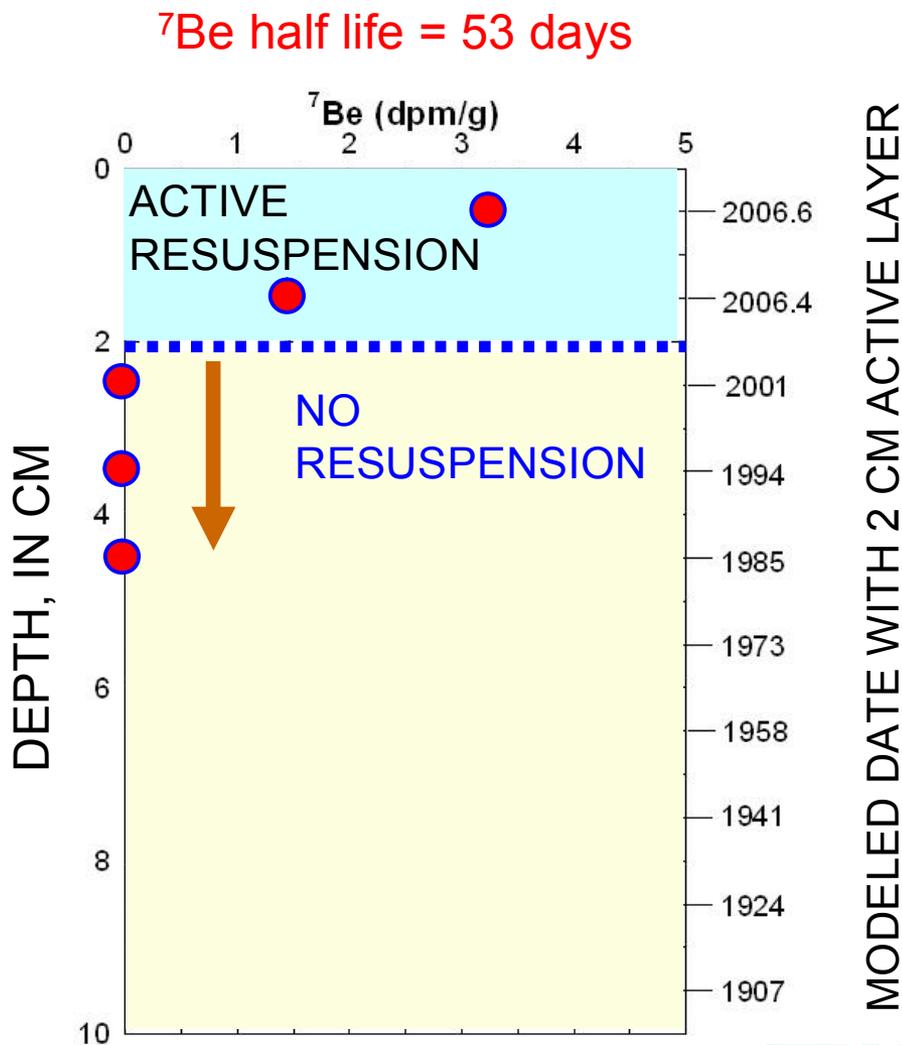
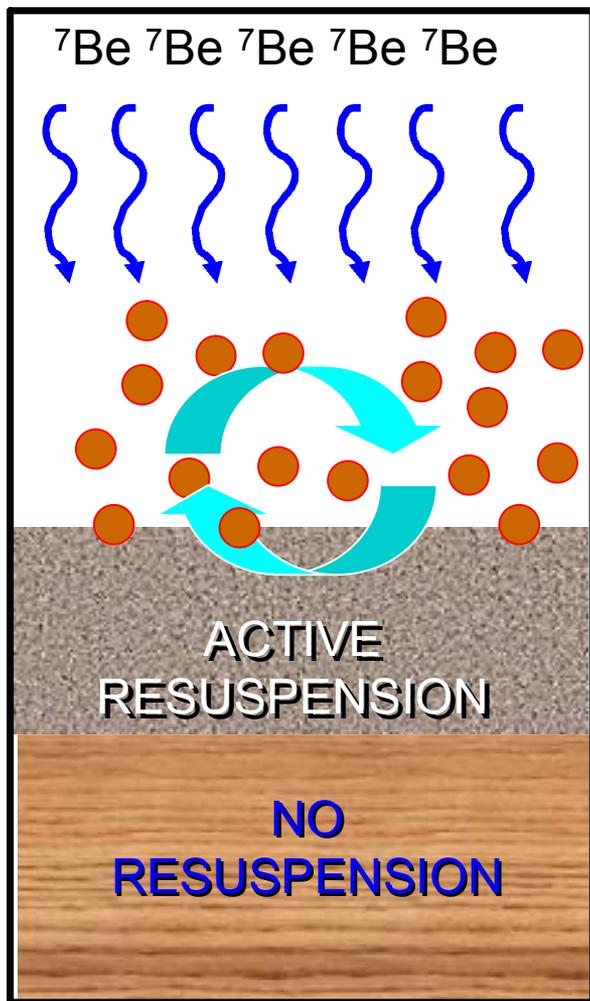
Deep sed trap
0.53 g/cm²/yr
2.7x10⁻⁸ g Se/cm²/yr
497 Kg Se/yr

Shallow sed trap
0.02 g/cm²/yr
1.2x10⁻⁸ g Se/cm²/yr (*)
219 Kg Se/yr (*)

Deep sed trap
0.32 g/cm²/yr
1.4x10⁻⁸ g Se/cm²/yr
254 Kg Se/yr

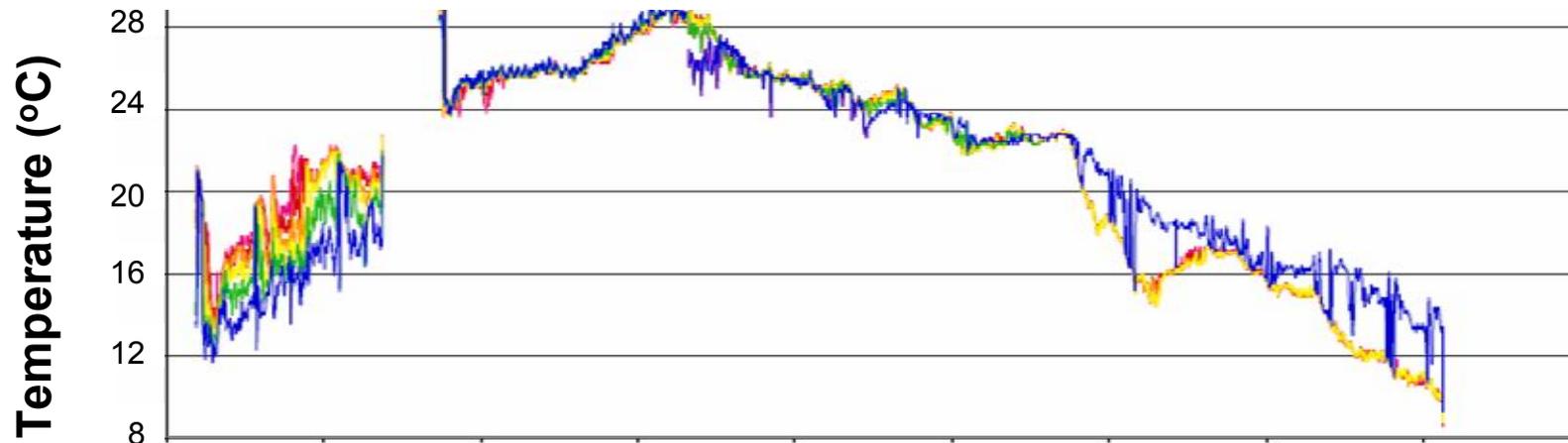
Note
(*) single value

Sediment resuspension

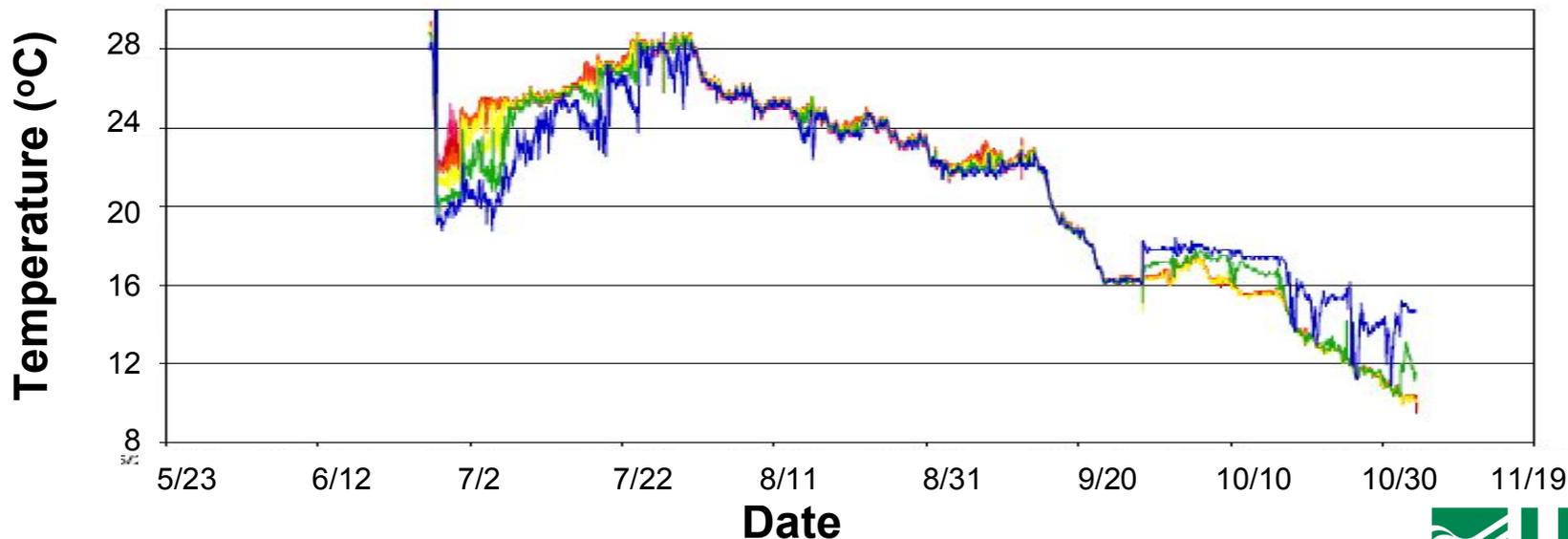


Sediment resuspension

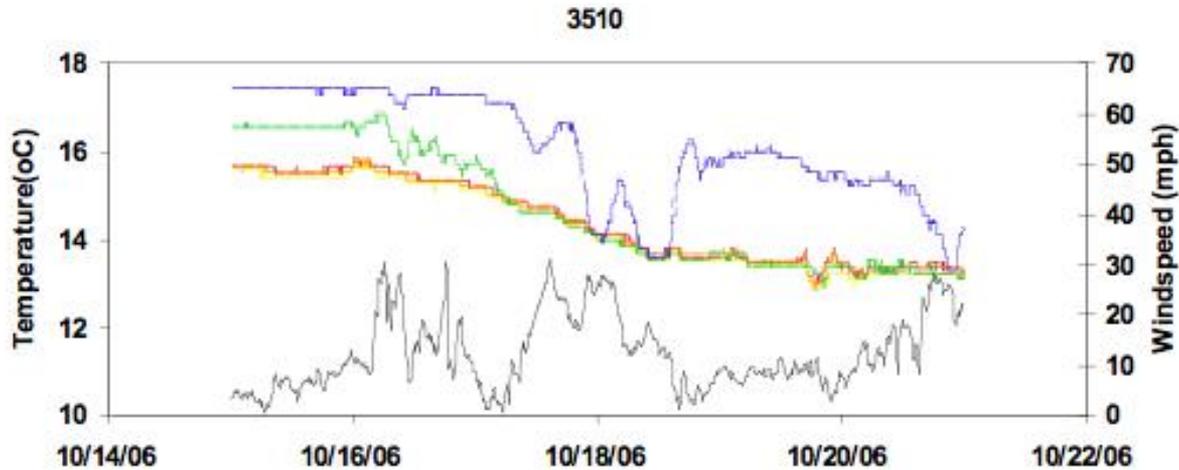
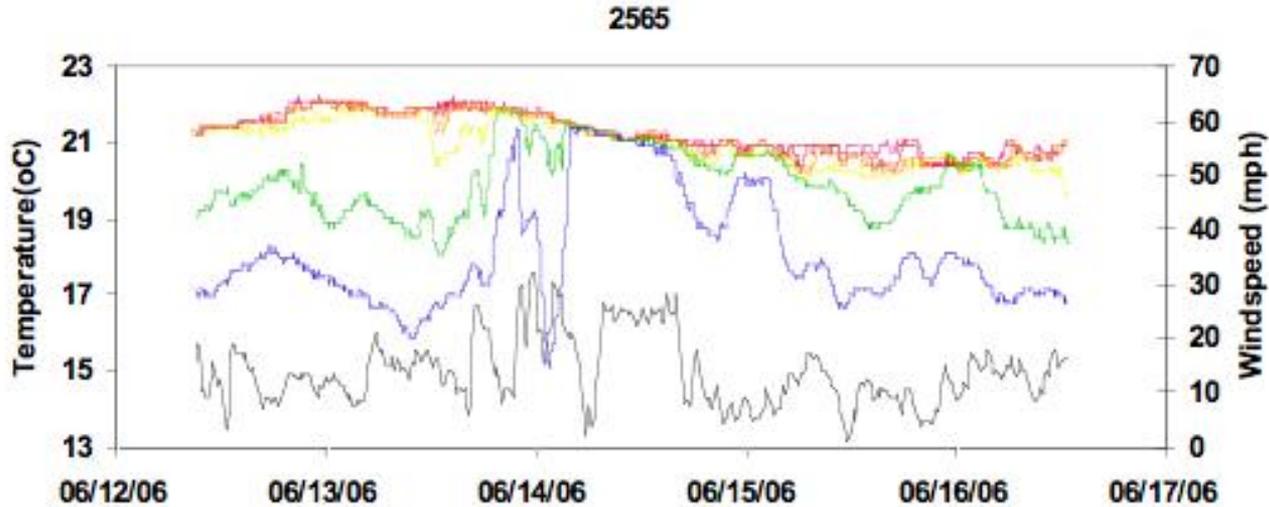
Temperature logger summary for site 2565



Temperature logger summary for site 3510

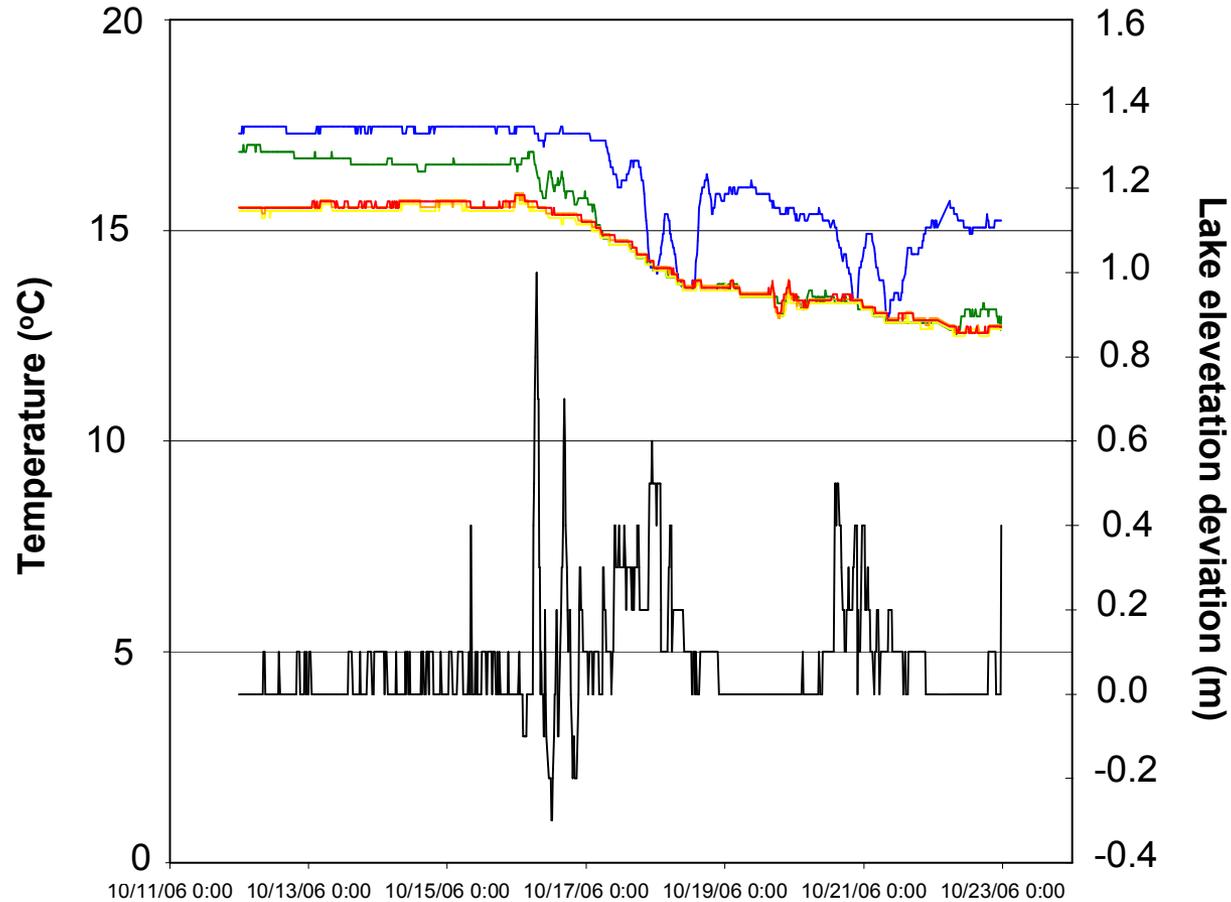


Temp equilibration

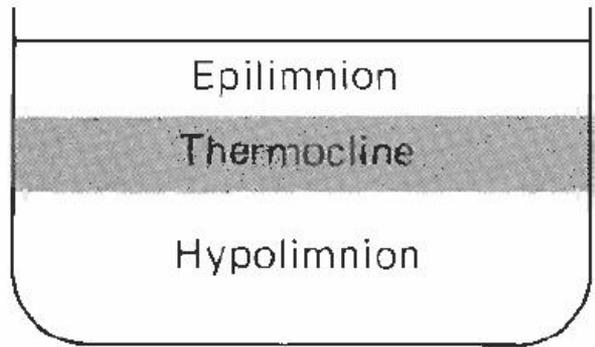


Temp equilibration

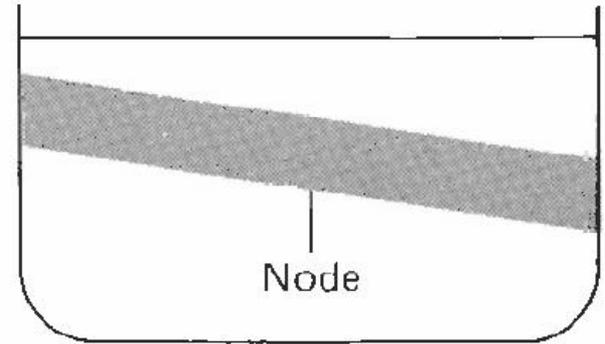
Site 3510



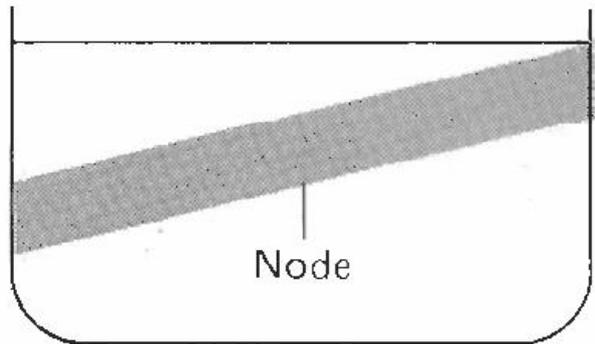
INTERNAL WAVES



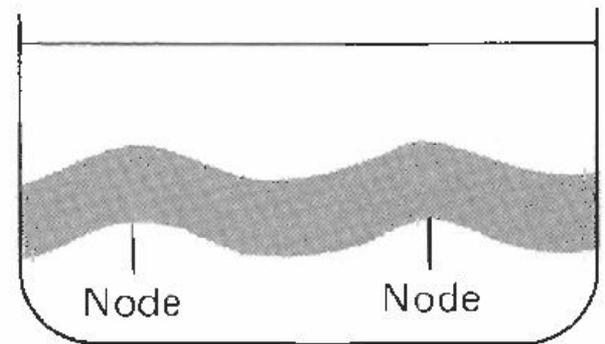
(a)



(b)



(c)

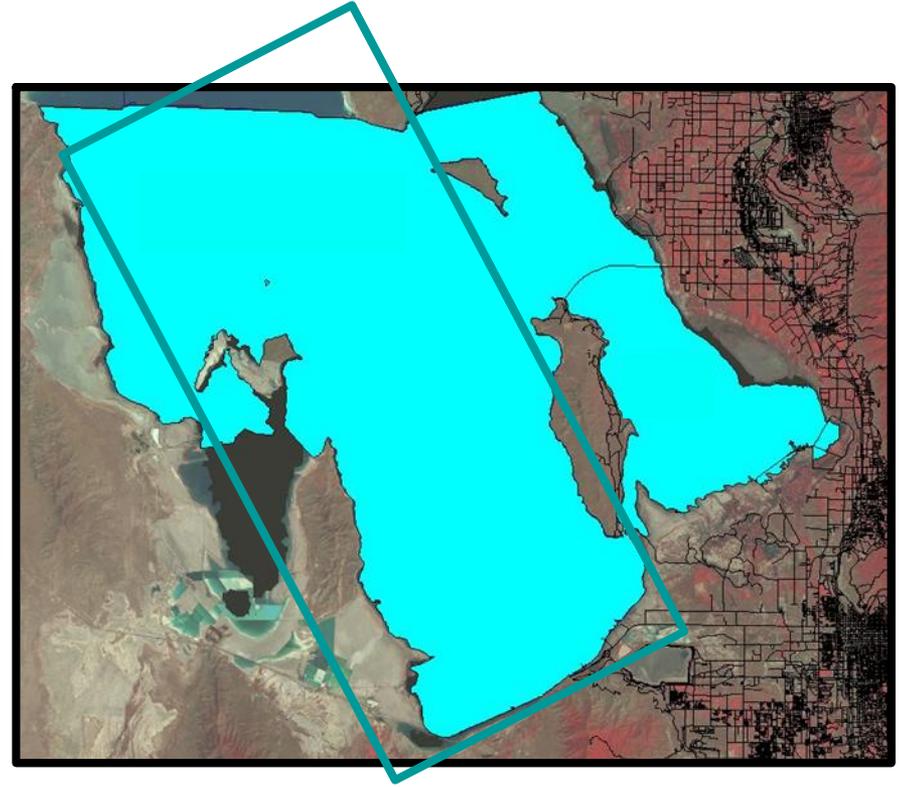


(d)

From Boyce (1974)

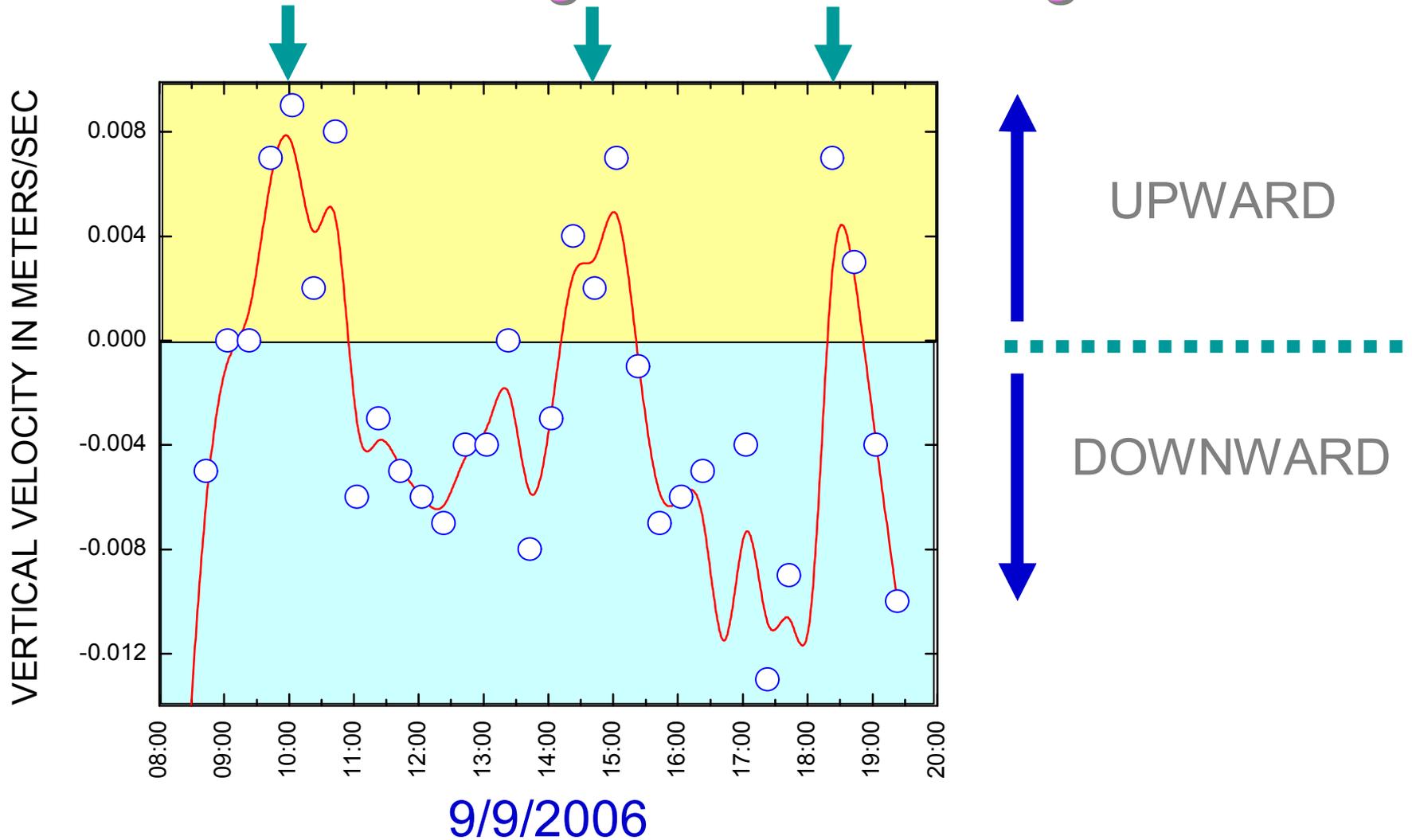
INTERNAL WAVE FREQUENCY

$$T = \frac{2L}{\sqrt{g \left(\frac{\rho_h - \rho_e}{\rho_h} \right) / (z_h^{-1} + z_e^{-1})}}$$



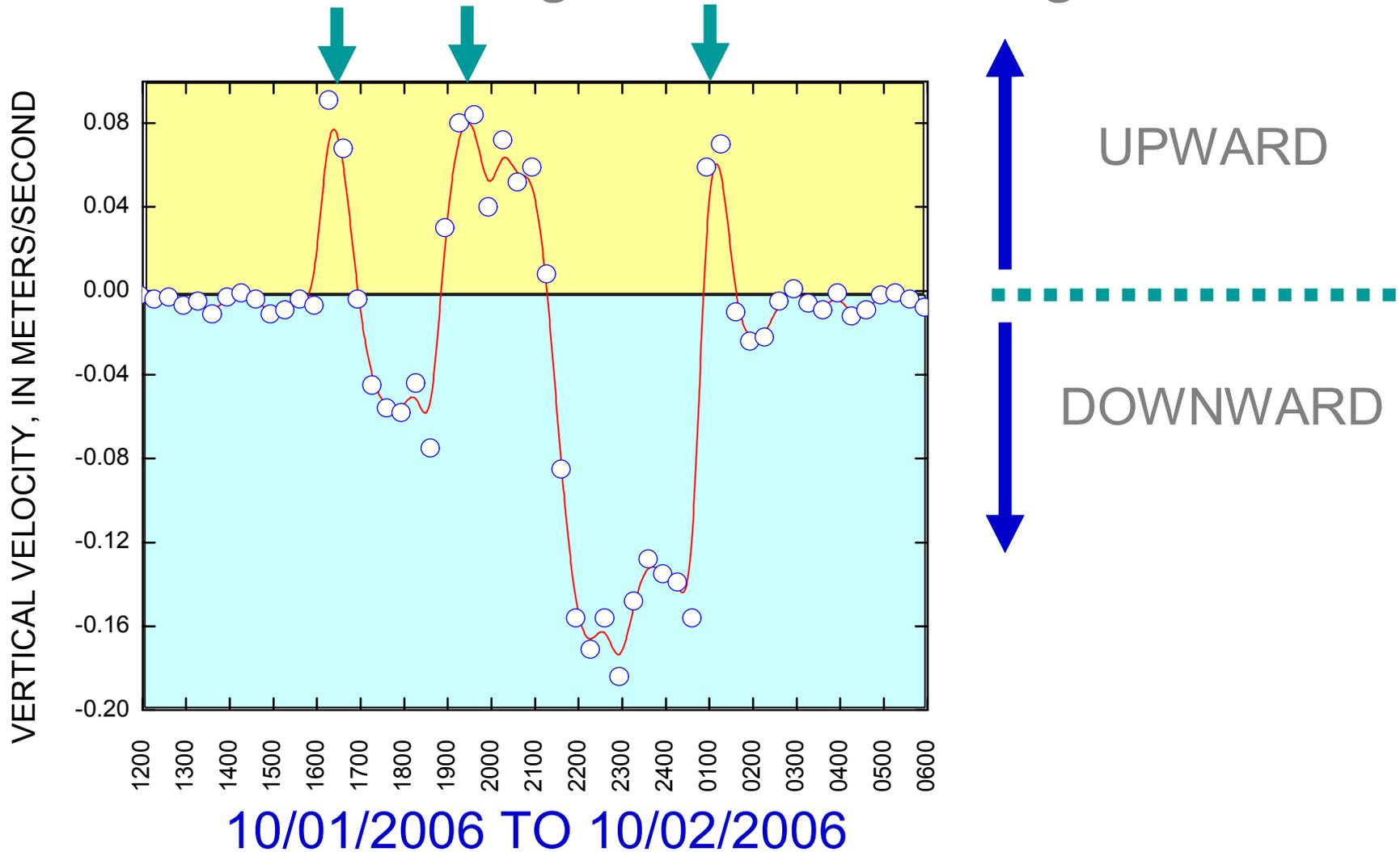
ADCP EVIDENCE OF SEICHES

breaking or non-breaking?

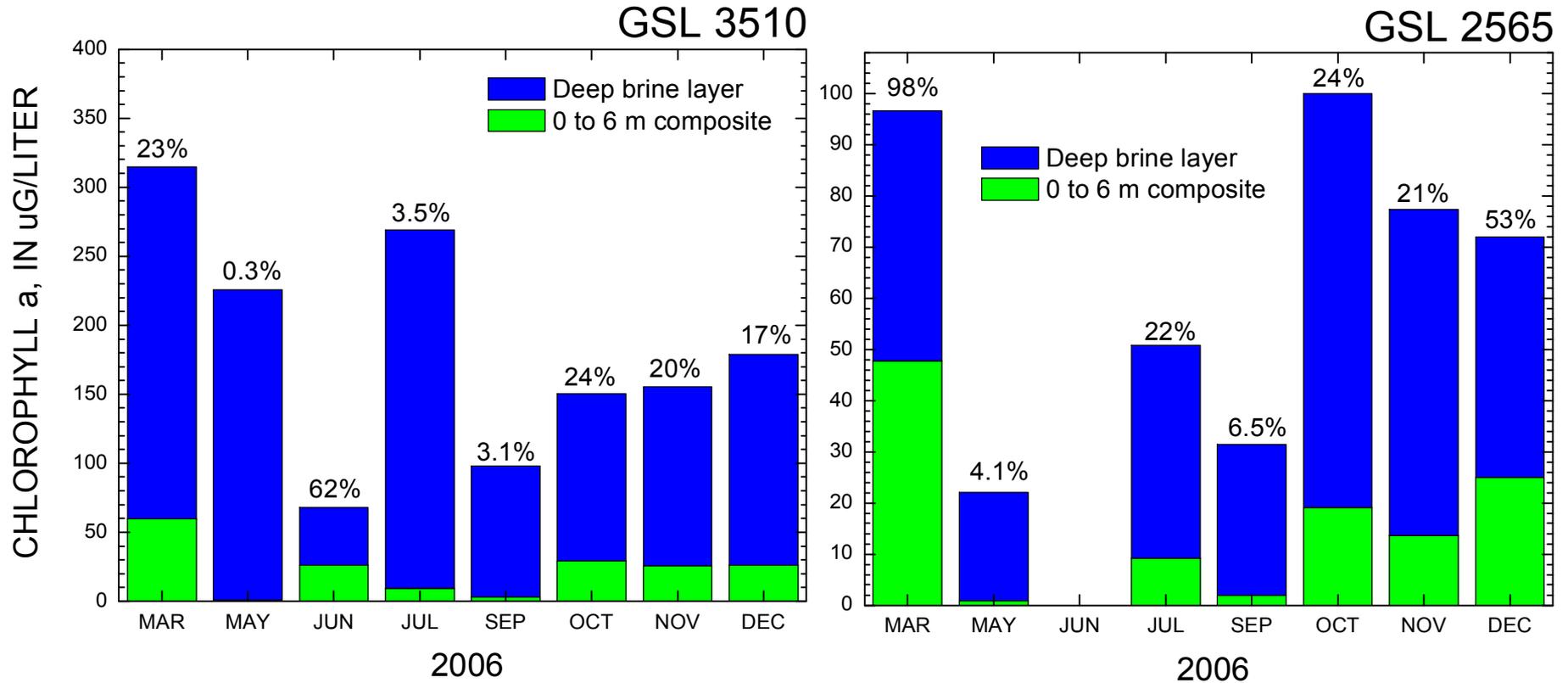


ADCP EVIDENCE OF SEICHES

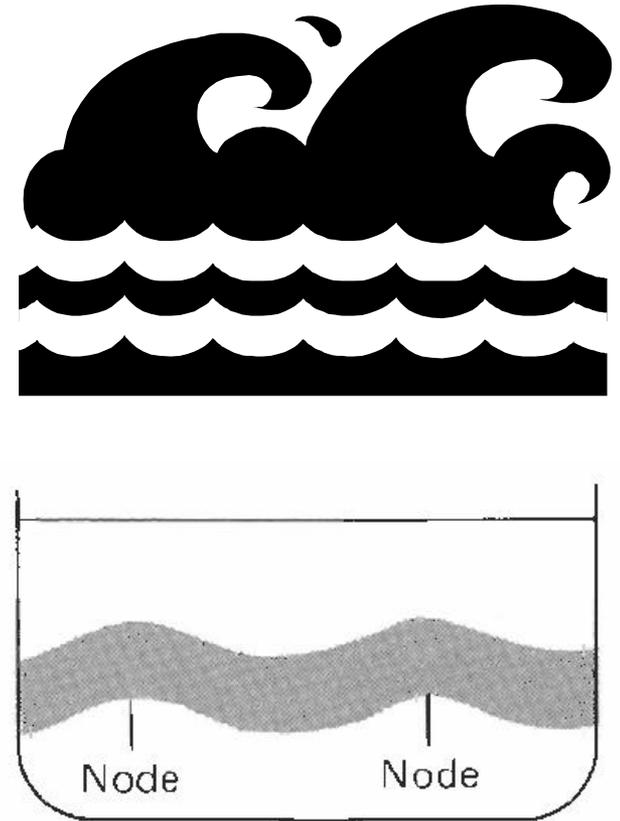
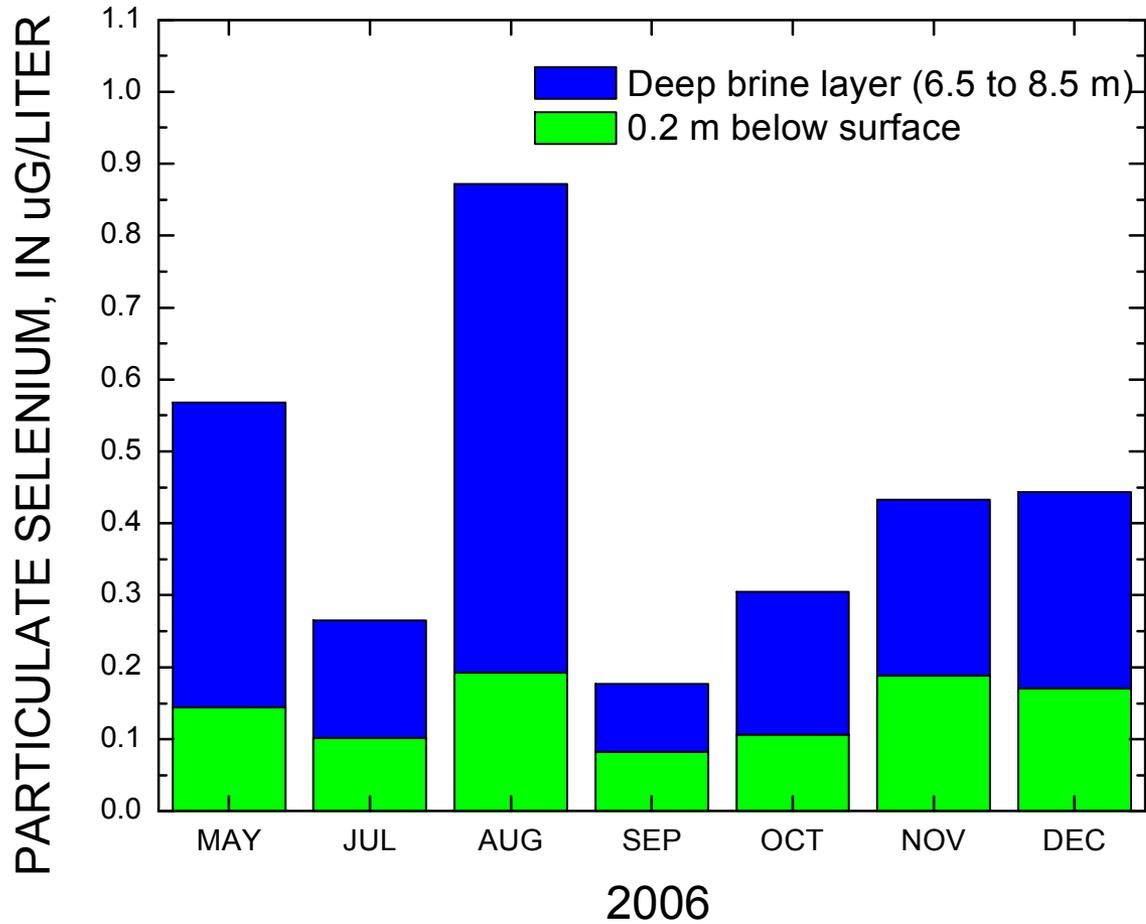
breaking or non-breaking?



DBL CHLOROPHYLL POOL



DBL SELENIUM POOL





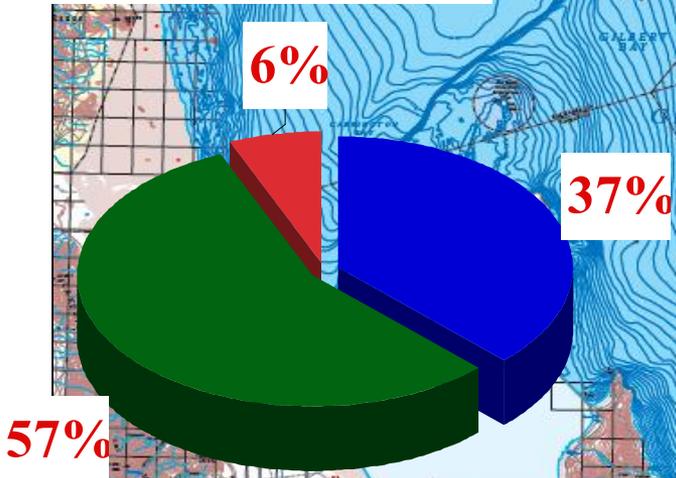
Realistic percentage of overall removal – since likely sed rate 5x lower

Volatilization:
 231 Kg/yr (u = 5MPH)
 2425 Kg/yr (u = 25MPH)

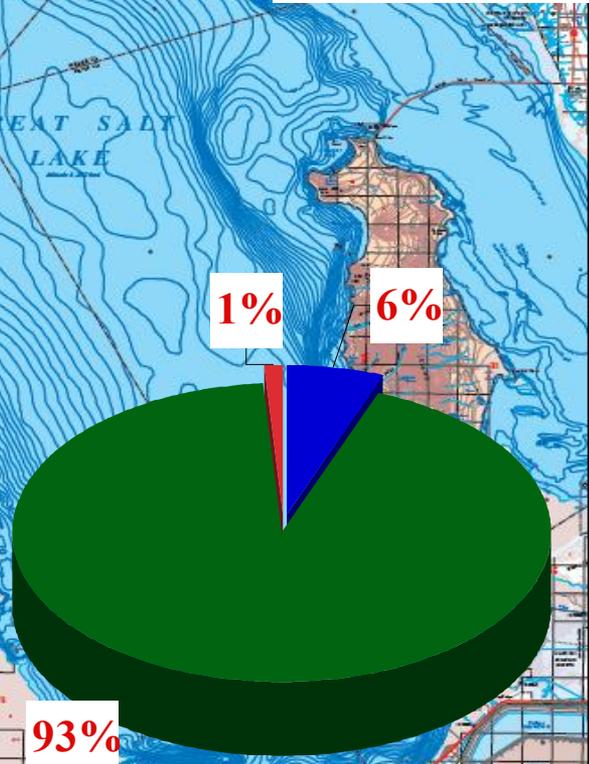
Harvesting brine shrimp/cysts:
 26 Kg/yr

(Marden, 2006)

u = 5 MPH

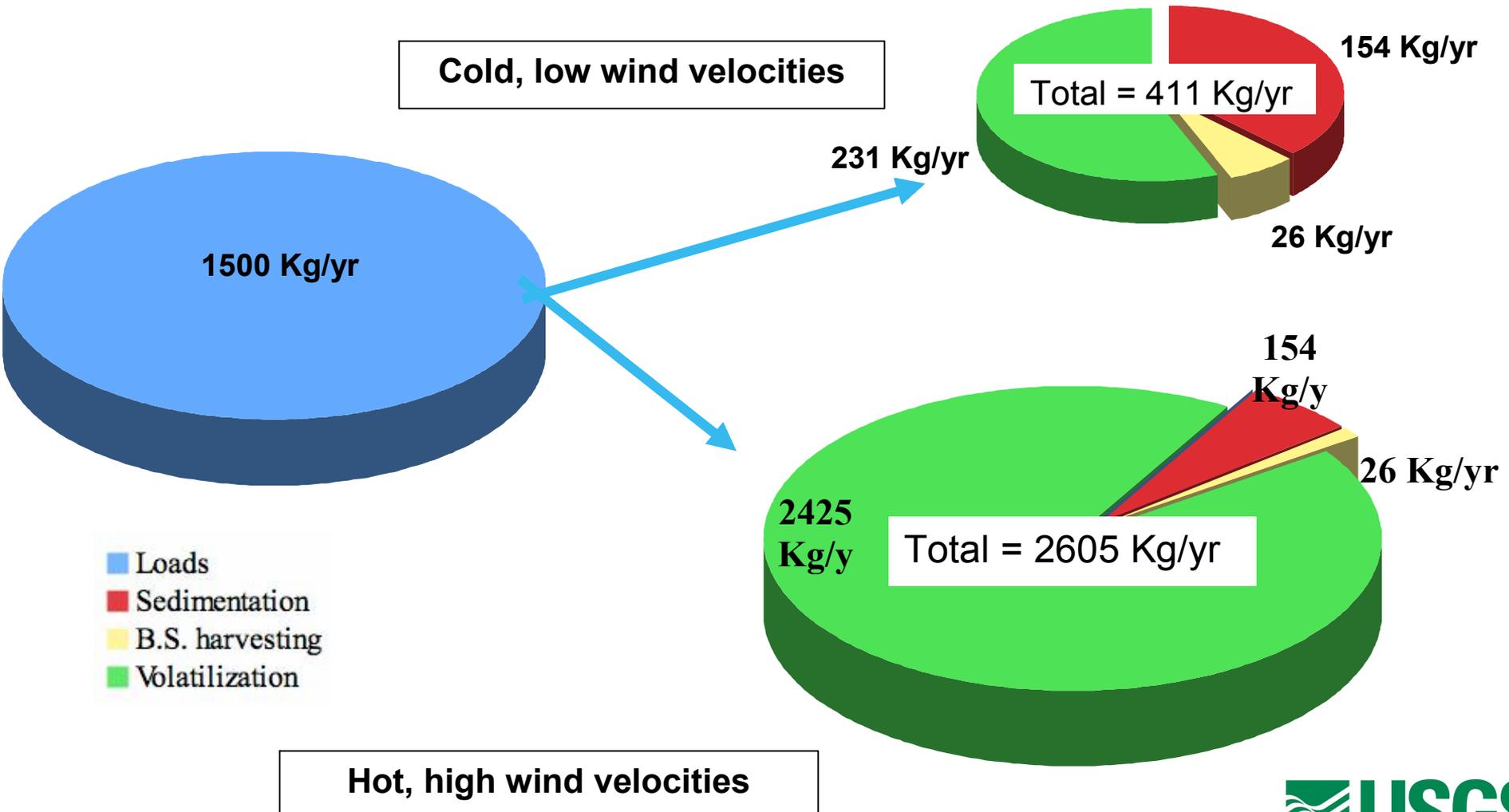


u = 25 MPH

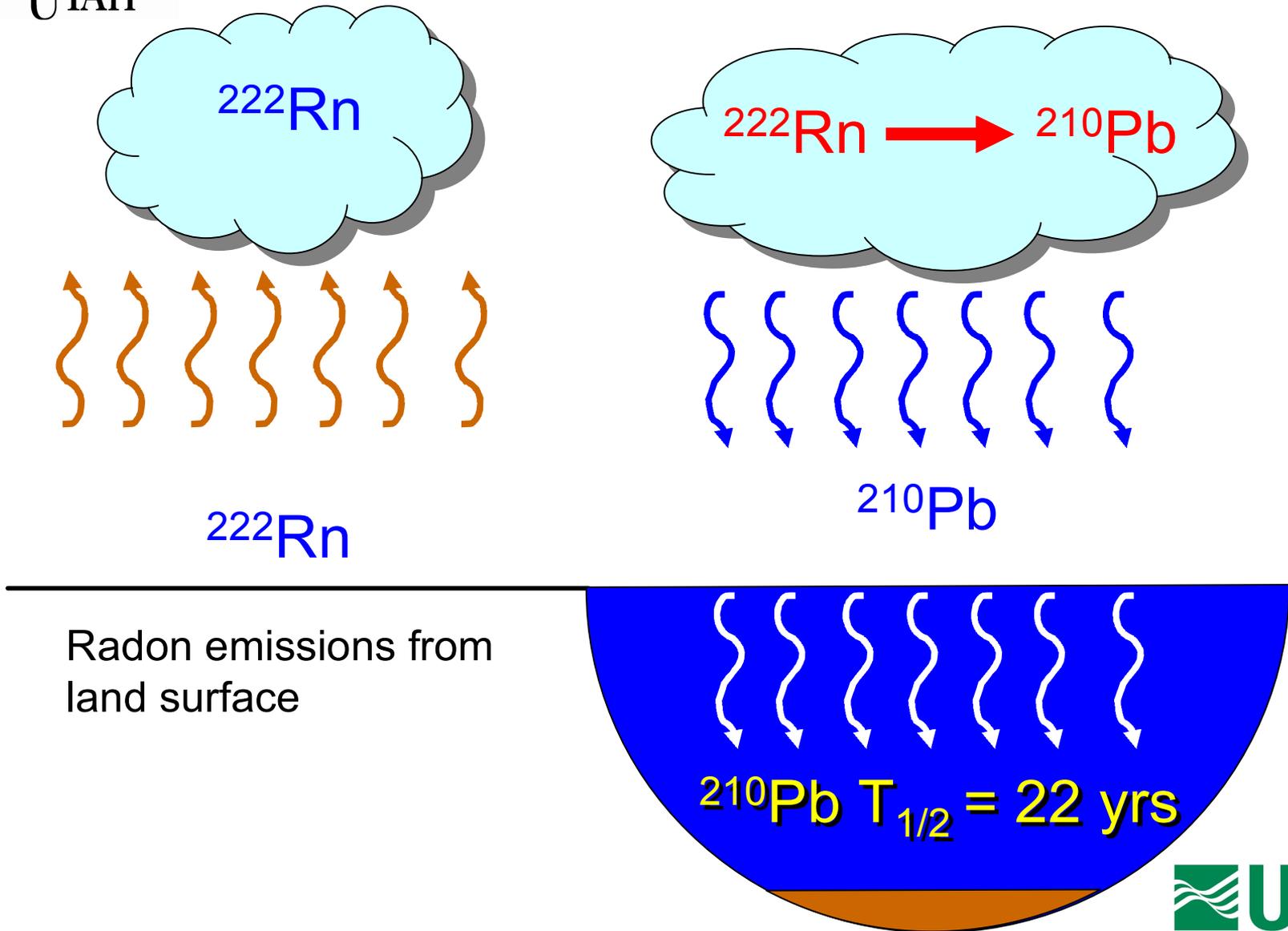


Sedimentation:
 154 Kg Se/yr

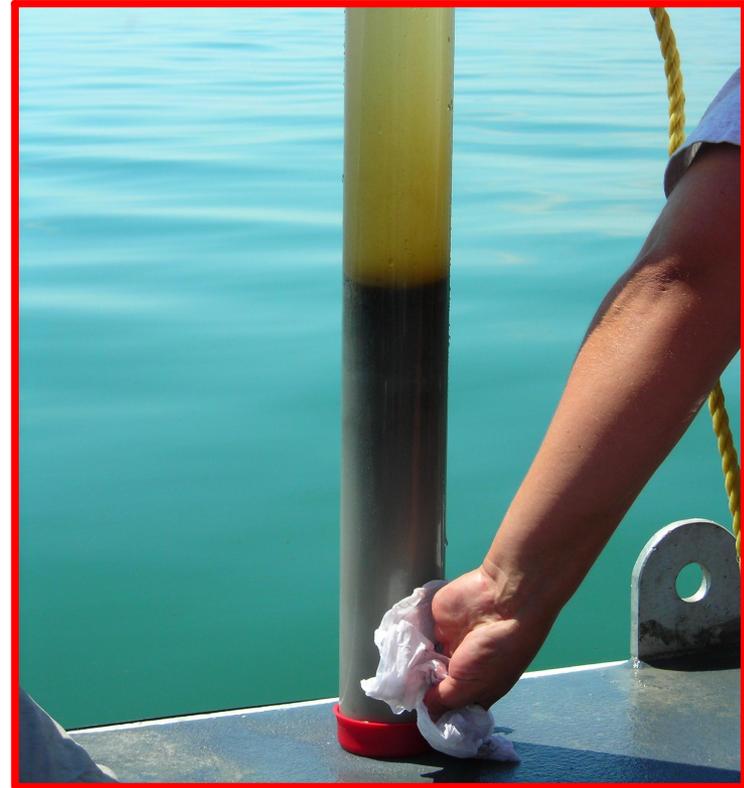
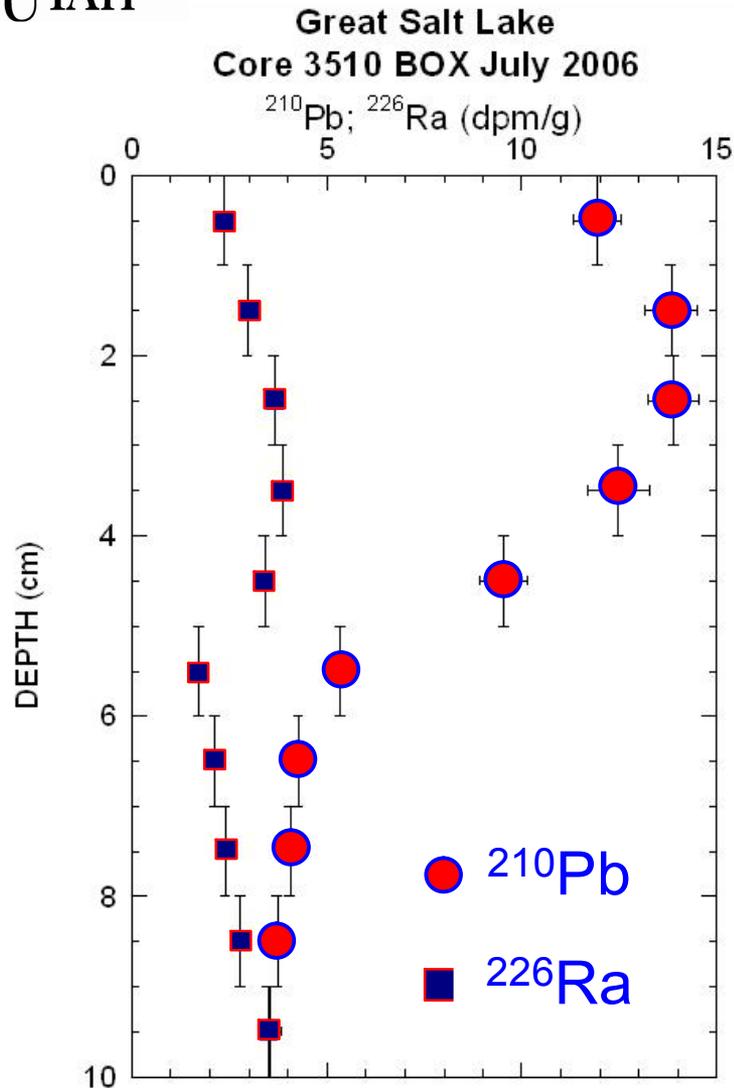
Realistic selenium flux distribution- Since likely net sed rate 5x lower



Net sedimentation flux



Net sedimentation flux

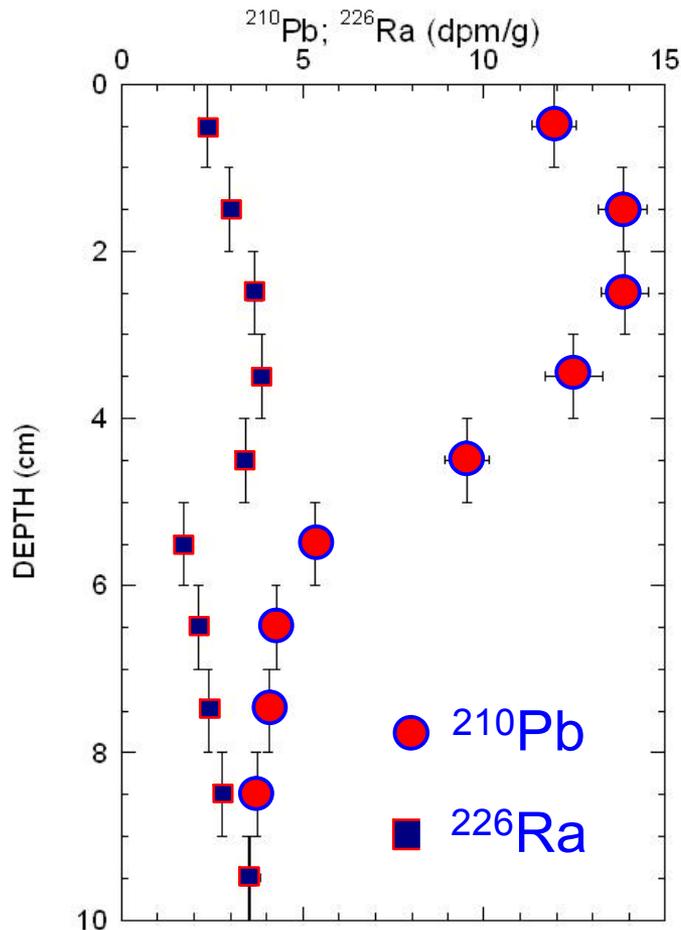


Unsupported ^{210}Pb

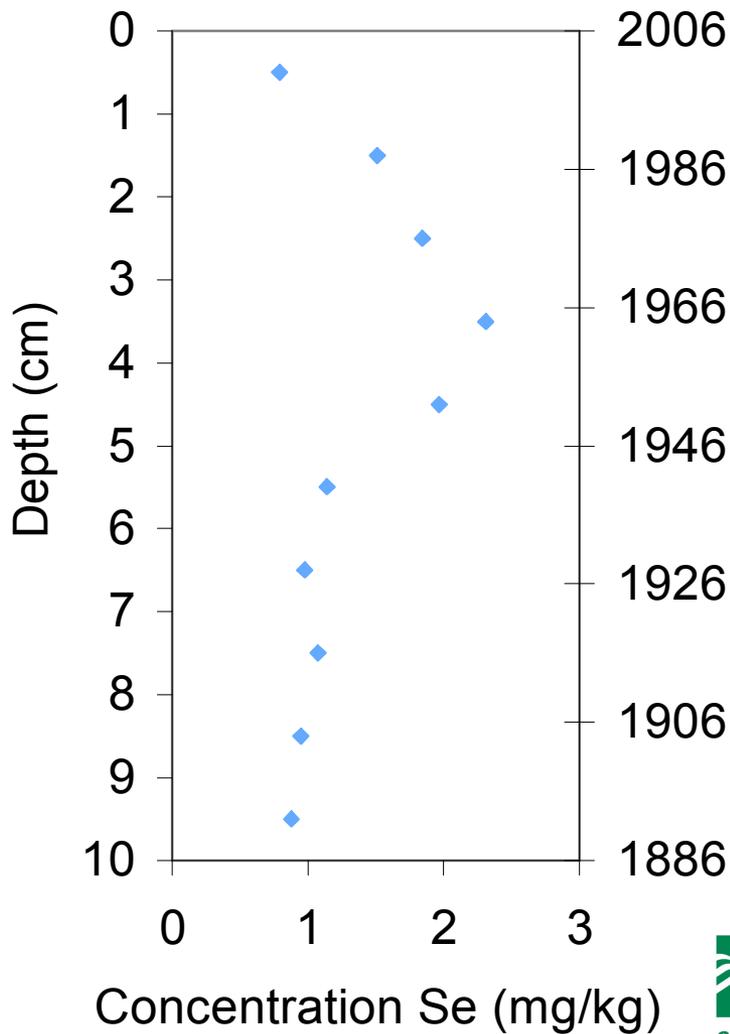
$^{210}\text{Pb} - ^{226}\text{Ra}$

Analysis in core sample

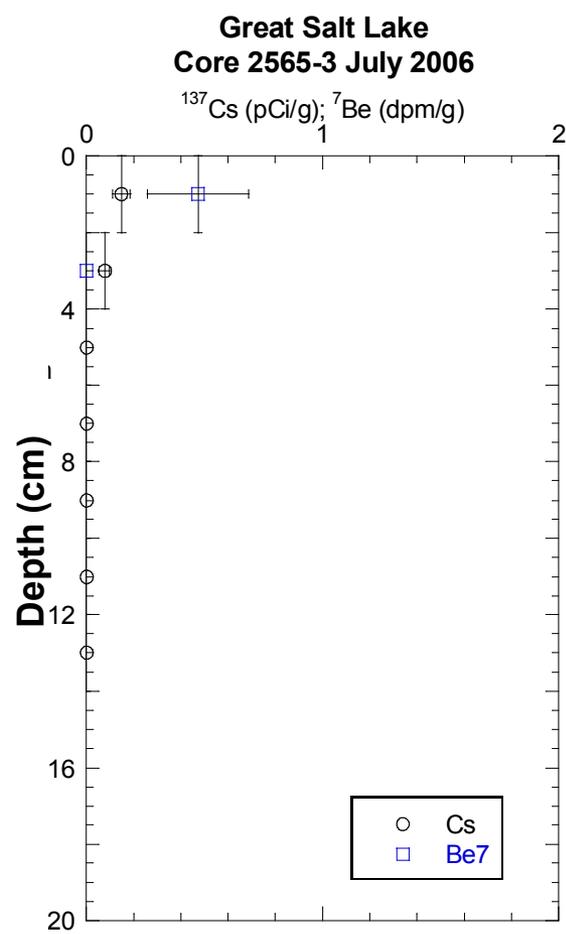
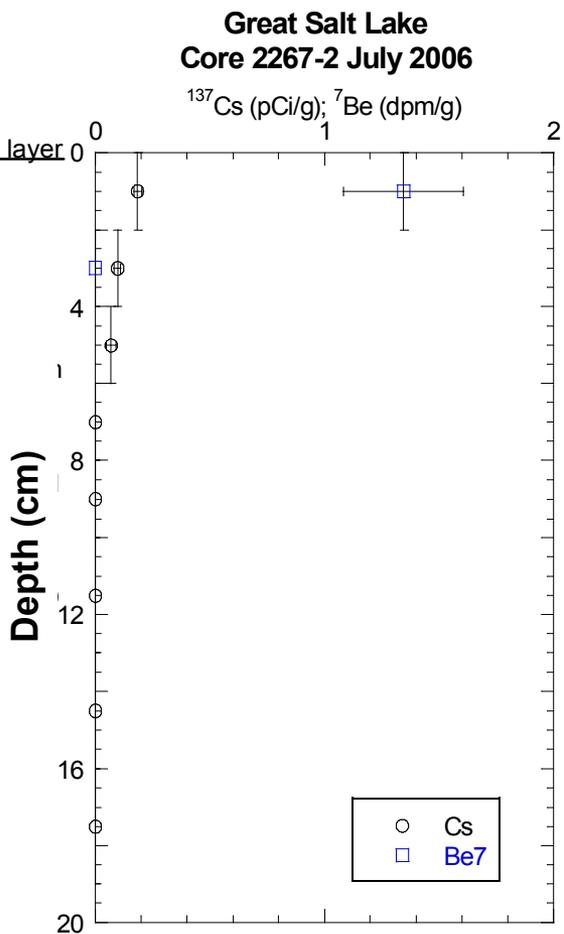
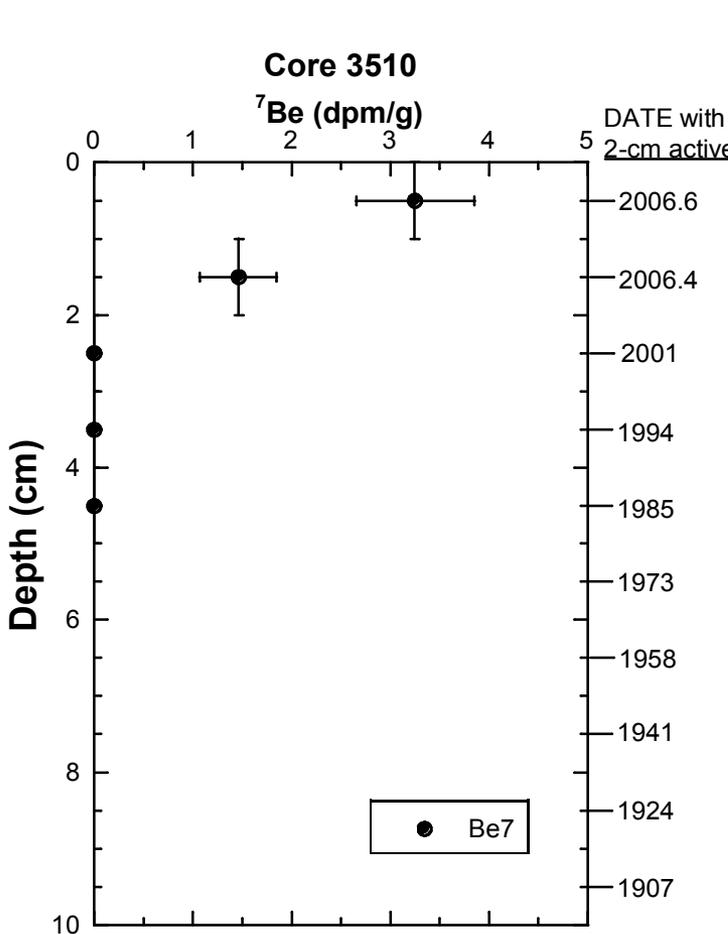
Great Salt Lake
Core 3510 BOX July 2006



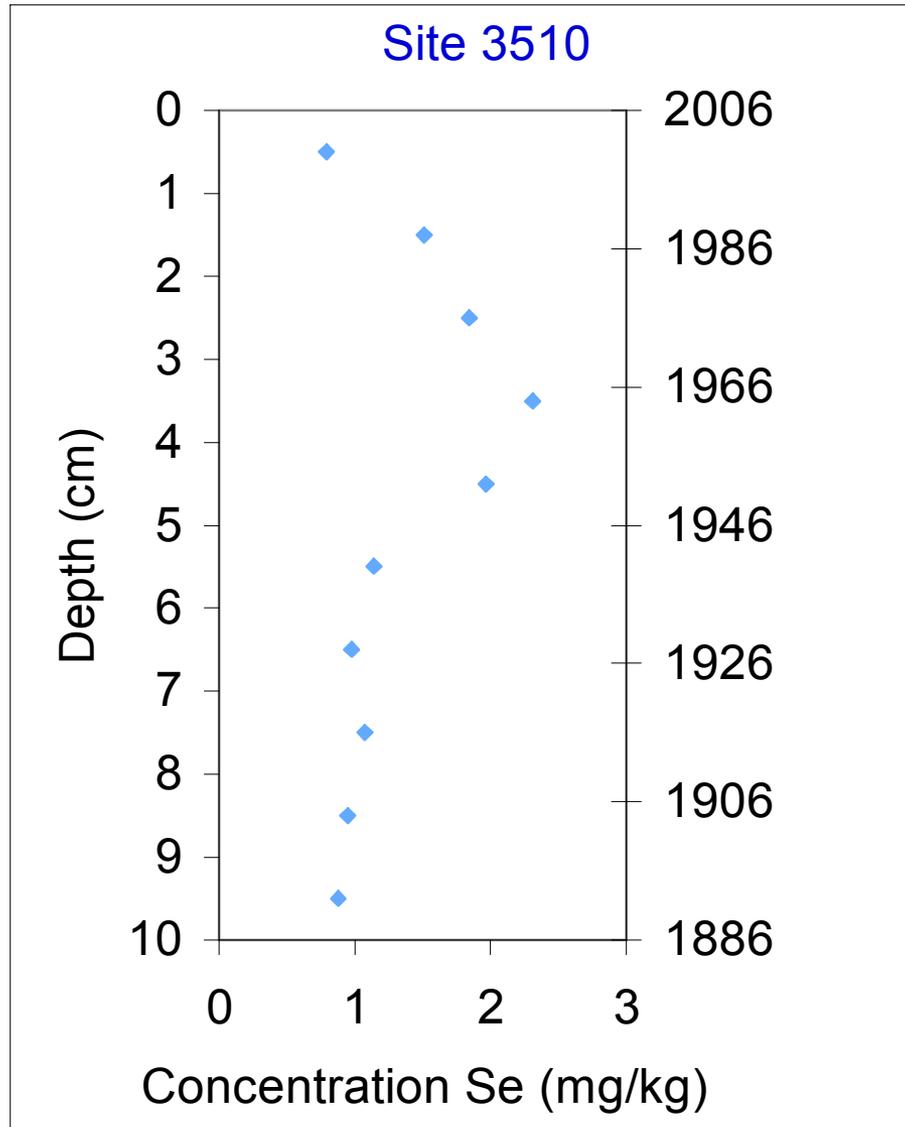
Site 3510



Sediment resuspension



Se profile in core

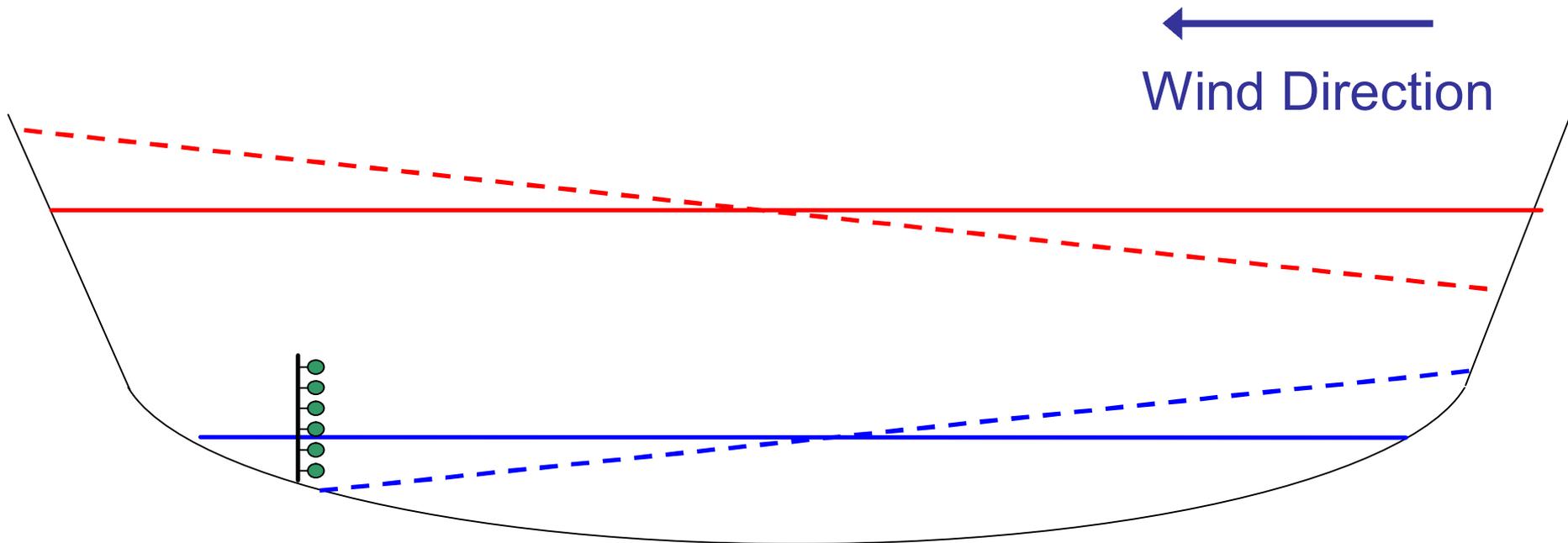


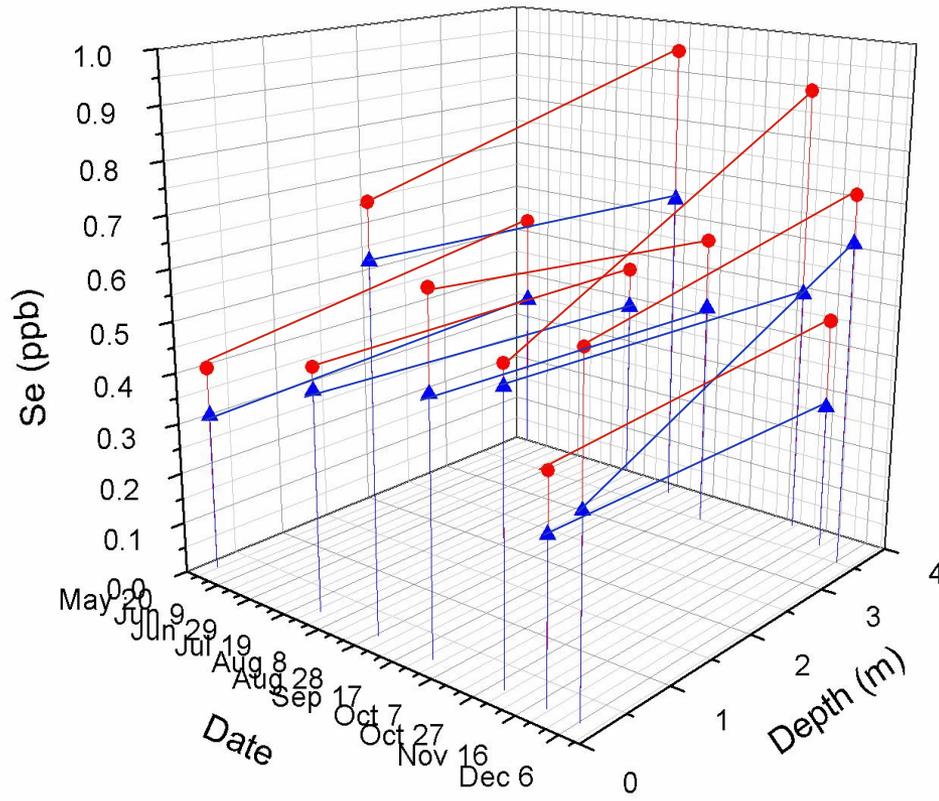


Seiche

Displacement of Water
Responding Oscillations

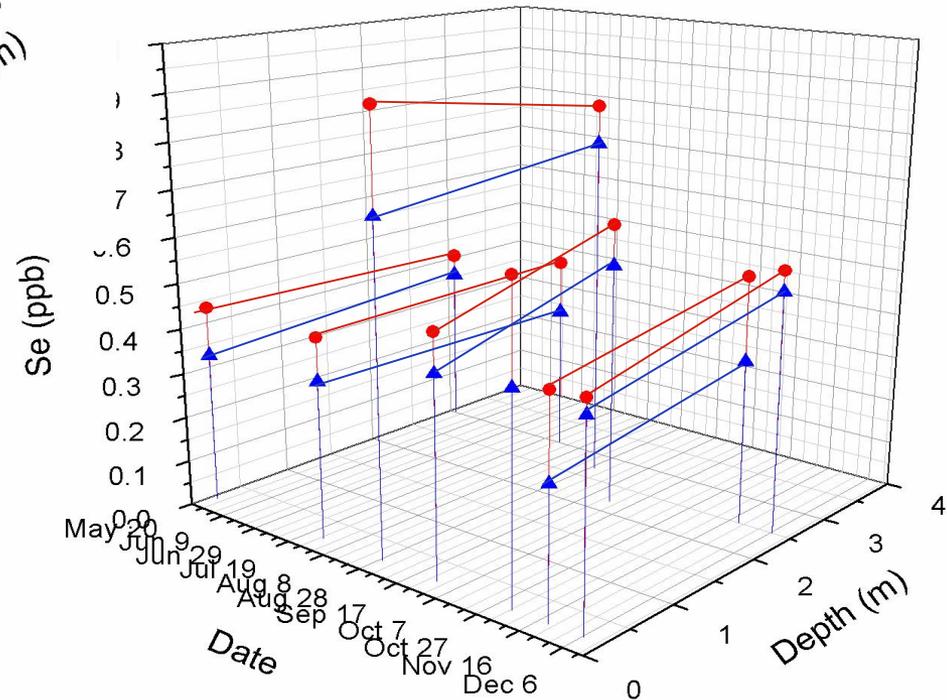
Set up by Wind and
Atmospheric Pressure





Site 2767

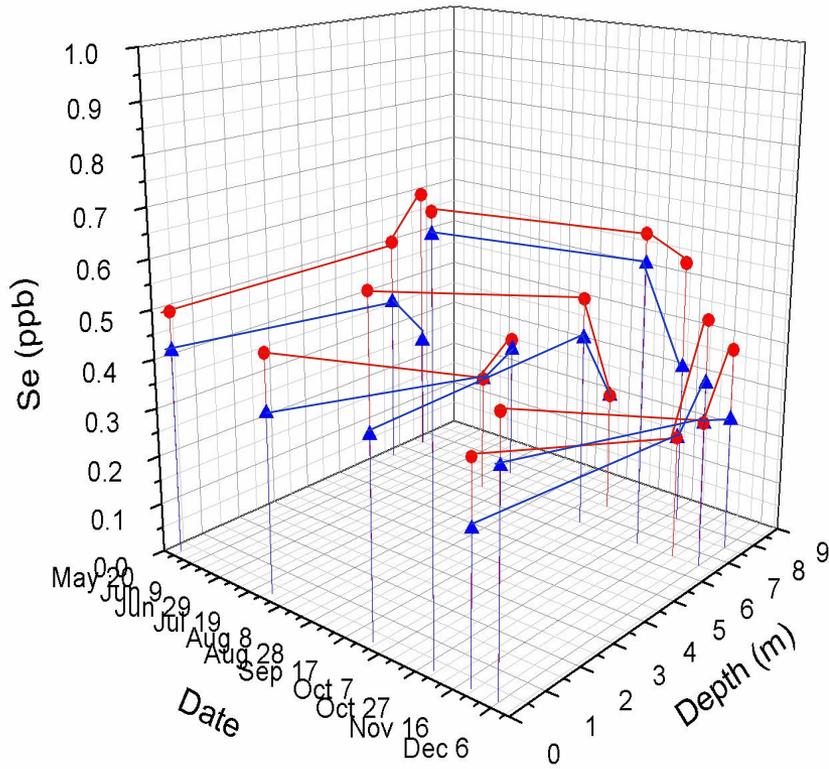
- RA
- ▲ FA



Shallow brine layer

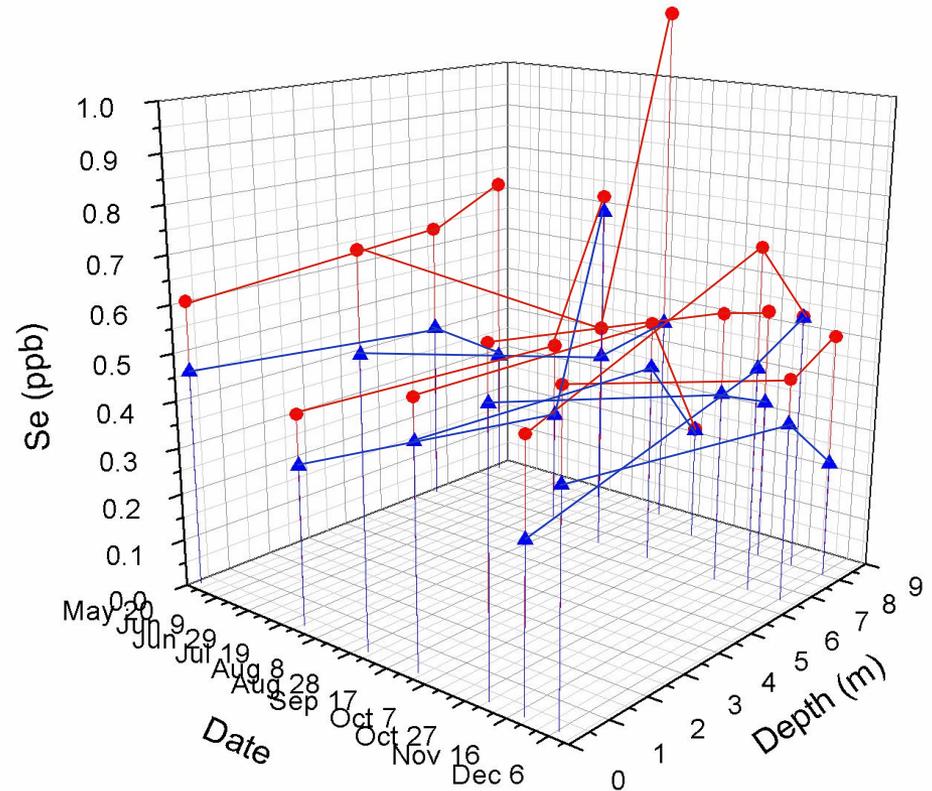
Site 2565

- RA
- ▲ FA



Site 3565

- RA
- ▲ FA



Shallow and
deep brine
layers